Techincal note for the Mock LISA Data Challenge 1.1

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This work contains the results of several searches of blind data sets prepared by the working group of the LISA International Science Team for Round 1 of the the Mock LISA Data Challenge (MLDC). These results address Challenge 1.1, monochromatic binary systems. The algorithms used to perform these searches are the Blocked-Annealed Metropolis Hasting algorithm (BAM) and a Genetic Algorithm (GA).

I. INTRODUCTION

As the BAM algorithm and GA the have been discussed in previous work [4, 5] we will give only a brief overview of their working details, as well as the updates that have been made to the published versions of the algorithms.

The BAM algorithm starts with a search phase that is followed by an exploration of the paramter posteriors. During the search phase simulated annealing is used to encourage exploration of the full parameter space. The annealing process effectively smooths the likelihood by the inclusion of a heating term. As the heat is removed the smoothed likelihood surface slowly anneals to the true surface. During this search phase the proposal distributions used to drive the Metropolis-Hastings sampling can be non-Markovian. Thus the search phase of the BAM algorithm is true Markov Chain Monte Carlo (MCMC) method. However, when the search phase is complete, and the sampling phase has begun, the proposal distributions are purely Markovian, and the subsequent portion of the chain can be used to explore the PDFs.

The BAM algorithm is optimized to search for multiple, densely packed galactic signals. A key element of the BAM algorithm is blocking. The blocks in the BAM algorithm are small sub-units of the frequency range being searched. The search region is broken up into equal sized blocks, allowing the algorithm to step through these blocks sequentially, and update all sources within a given block simultaneously. This blocking provides a means to update the most highly correlated sources together, improving accuracy and efficiency.

In our previous work [5] the BAM algorithm used the F-statistic [2] to limit the search to three variables per template, frequency and sky location (f, θ, ϕ). The extrinsic parameters - amplitude, polarization, inclination, and initial orbital phase (A, ψ, ι, φ_o) - were then recovered algebraically. While this method is still used as a first approximation for our searches in this work, we have extended the BAM algorithm to a full 7 parameter search so that we may match the PDFs for all seven parameters. Another update is that we have replaced the low frequency approximation with the rigid adiabatic approximation [6], using a fast new algorithm developed by Cornish & Littenberg [7]. The new waveforms give excellent matches to the full LISA Simulator output across the entire LISA band.

The GA is an evolving solution set whose breeding is based on fitness, as measured by the log likelihood: the greater the fitness of a template (organism), the more likely it is to breed. Through breeding and mutation the set of organisms evolves toward the parameter values of the sources of the gravitational waves in the data stream. In our previous work [4] the GA also used the F-statistic to limit the search space, and again we have extended the search to 7 parameters for this work. The GA is used in this work to search only for the signals of the isolated binary systems (Challenges 1.1.1 - 1.1.3). This was done because the GA has not yet been fully optimized for high density, multi-source searches. The GA that is used in these searches is the Genetic-Genetic Algorith (GGA) discussed in our previous work. An update that has been implemented in these searches is the inclusion of independent Parameter Mutation Rates (PMRs) for each of the parameters being searched for. As the GGA is the only type of GA used in these searches all will be referred to henceforth simply as GAs.

Depending on the analysis method used we report our results in one of two ways: The BAM algorithm produces PDFs which can be used to extract statistical data about the source or sources. Thus when quoting results of a BAM search the values given will include the mean of the parameter based on the data from the sampling phase of the search, as well as the mode for each parameter type (Note: This is the mode of marginalized PDF for each the parameter type, not the mode of the full $7N$ dimensional posterior). Two methods are used to measure the uncertainty in the recovered parameter values. The first is an approximation determined by a Fisher Information Matrix (FIM) approach, the second is the standard deviation of the chains. Results from the GA will consist of the parameter values for the best fitting organism of the final generation of a data run. Uncertainty estimates for the GA results use the FIM approach.

Please note that these two methods of searching were conducted independently of each other. Results garnered from the BAM algorithm were not used to aid the GA searches or vice-versa.

II. SEARCH RESULTS

A. MLDC 1.1.1a

In this search we are seeking the signal from a single binary system located in the frequency range $[0.9, 1.1]$mHz. Initial exploratory searches of the entire range were performed using the BAM algorithm and a GA. Each method quickly localized the search to the neighborhood of 1.0627mHz, a result that is easily verified by viewing the Fourier Transform of the time series data.

The BAM algorithm searches involved an F-statistc 'pre-search' that provided a good first estimate for the parameter set. These parameters were then used as the starting point for a full 7 parameter search. The results from the 7 parameter search were then used as the starting point for the final MCMC sampling phase. The reason for the intermediary step is to ensure the extrinsic variables had fully "burnt in", and that the subsequent movement of the chain described the exploration of the posterior and not the migration from a poorly fitting location to that of the best fit. The marginalized PDFs for 1.1.1a are shown in Figure 1. The bimodality in some of the extrinsic parameters is easily understood: Note that the two peaks in polarization are separated by almost exactly $\frac{\pi}{2}$, and the initial phase peaks are separated by almost exactly π. This is due to the redundancy in the coordinates. The two peaks represent the same physical orientation of the binary system.

The initial BAM search separated the 0.2mHz range into 8 equal snippets, and $50,000$ steps were used to search each window, which were run consecutively on a 1.83GHz MacBook Pro in just under 5 hours. The first 7 parameter search was run on the same platform, using $500,000$ steps in the chain. This run took 5 minutes. The wide variation in time per step is mostly a factor of the distribution functions used. Since the parameters are relatively near the proper solution it is more efficient to use small uniform proposals rather than more computationally intensive proposals such as a multivariate gaussian proposal using the FIM. The final search contained $5,000,000$ steps and took 48 minutes on the MacBook Pro. It should be noted that running the full BAM algorithm on a large bandwidth, single source search is like using a hydrogen bomb to kill a cat: there are easier and more efficient methods!

For the GA, the first cursory search using an F-statistic based approach locked in on the presence of a signal around 1.062732mHz. In this search the data snippet was also divided into 8 equal windows, and $100,000 steps$ were used to search each of the windows. The search was performed on the 1.83GHz MacBook Pro in just under 2 hours. The second step was to use this information as the starting point for a GA that searched over all 7 parameters. The search discovered the source parameters listed in Table II contained $15,000$ steps and was completed in 3 minutes.

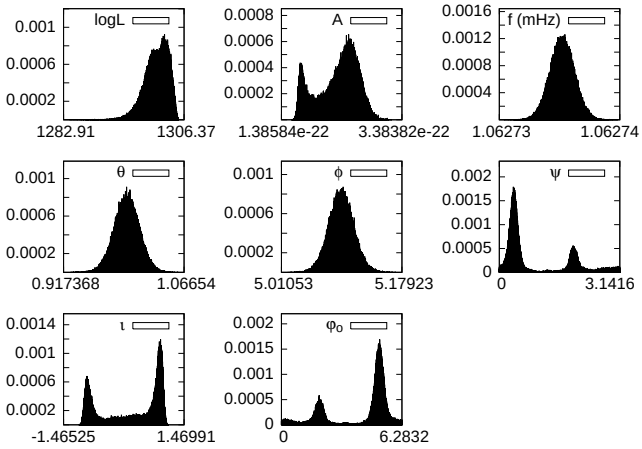

FIG. 1: Histograms of the parameter values in the sampling phase of a BAM search of MLDC Challenge Data Set 1.1.1a.

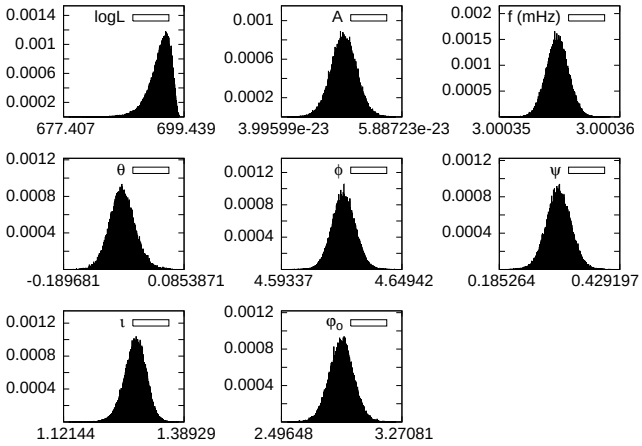

FIG. 2: Histograms of the parameter values in the sampling phase of a BAM search of MLDC Challenge Data Set 1.1.1b.

B. MLDC 1.1.1b

In this search we are seeking the signal from a single binary system located in the frequency range $[2.9, 3.1]$mHz. The initial exploratory searches of the range were conducted using the BAM algorithm and a GA which each quickly localized the search to the neighborhood of 3.0004mHz, a result that is easily verified by viewing the Fourier Transform of the time series data.

For the BAM algorithm, the initial search which again separated the 0.2mHz range into 8 equal snippets, $50,000$ steps were used to search each window, which were run consecutively on a 1.83GHz Intel Dual-Core MacBook Pro in just over 14 hours. The first 7 parameter search was run on the same platform, using $500,000$ steps in the chain. This run took 15 minutes. The final sampling contained $5,000,000$ steps and took 2.5 hours on the same MacBook Pro.

As in 1.1.1a an F-statistic based GA was used to perform the first cursory search using 8 windows and $100,000$

TABLE I: Results of a BAM search of the MLDC Challenge Data Set 1.1.1a. An asterisk (*) denotes parameter uncertainties from with a multimodal histogram (see Figure 1).

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Recovered Values							
Mode	2.500	1.062732809933	9.9545e-01	5.0969	3.6569e-01	8.9700e-01	5.1233
Mean	2.313	1.062732652071	9.9560e-01	5.0943	8.9955e-01	2.1241e-01	4.2207
Uncertainties							
FIM Uncertainty	1.7645e-01	7.0383e-07	1.4474e-02	1.6408e-02	8.7287e-02	6.8046e-02	1.9184e-01
Chain Std. Dev.	3.3186e-01*	6.9609e-07	1.4880e-02	1.6512e-02	8.4552e-01*	7.4019e-01*	1.5708*

TABLE II: Results of a GA search of the MLDC Challenge Data Set 1.1.1a.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Recovered Values							
Top Organism	2.5739	1.0627324873	9.9325e-01	5.0912	3.4790	9.0351e-01	5.2033
Uncertainties							
FIM Uncertainty	0.1783	7.0520e-07	1.4513e-02	1.6353e-02	8.9569e-02	6.9683e-02	1.9561e-01

steps per window to search the region. This search took just over 5 hours to complete on the MacBook Pro. The next search was a 7 parameter search, which returned the values shown in Table IV performed $15,000$ steps and took 10 minutes to run.

C. MLDC 1.1.1c

A different template creation algorithm was used for this search, that includes the effects of the transfer function. Also, we simply used the Fourier Transform of the data to localize our search in frequency to the neighborhood of 10.5712mHz.

For the BAM algorithm, the initial search contained $25,000$ steps in the chain and took 1 hour on the MacBook Pro. The second and final search contained $1,000,000$ steps and took just under 2 hours (using the small uniform proposals). The results for this search are given in Table V

The search for the source with the GA contained $25,000$ steps and took 30 minutes to run. Its results are shown in Table VI.

D. MLDC 1.1.2

As the frequencies and sky positions of these sources were already known, the initial search using the F-statistic version of the search was simply to get an estimate for the extrinsic parameters. These were searches of $1,000$ steps with minimal heating. The second and third legs of the search were similar to those of Challenge 1.1 in both chain length and computational duration (with the time of each run increasing with the frequency of the source being sought after).

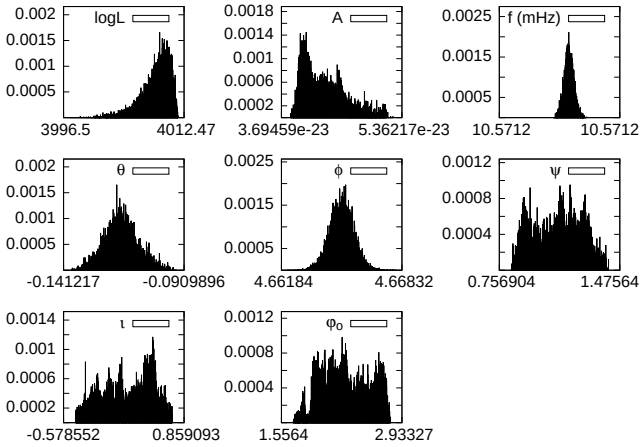

FIG. 3: Histograms of the parameter values in the sampling phase of a BAM search of MLDC Challenge Data Set 1.1.1c.

One question concerning the verification binaries for LISA is to what extent the knowledge of frequency and sky position will aid in extracting the other (extrinsic) parameters for these systems. Figure 4 explores this effect for one of these verification binaries (the binary chosen to represent AMCVn in the MLDC). For the two data runs represented in the plot, one used the *exact* frequency and sky position given and searched over the remaining 4 parameters, while the other was a standard 7 parameter search. As can be seen in the figure, the effect is fairly small, with only the initial phase having its mode shifted by an amount of order 1 to 2σ. The small level of the effect held true across the verification binaries. The results listed in Table VII and Table IX are the products of 7 parameter searches for each binary system.

For the BAM algorithm, the sampling phase consisted of $1,000,000$ steps in the chains, which took between 6 and 35 minutes (run times for lowest and highest fre-

TABLE III: Results of a search of the MLDC Challenge Data Set 1.1.1b

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Recovered Values							
Mode	4.923e-01	3.000356758996	-5.6613e-02	4.6224	3.0723e-01	1.2828	2.8991
Mean	4.973e-01	3.000356891589	-5.5572e-02	4.6223	3.0525e-01	1.2807	2.8820
Uncertainties							
FIM Uncertainty	1.8664e-02	5.2870e-07	2.5737e-02	5.1201e-03	2.3674e-02	2.2594e-02	7.1018e-02
Chain Std. Dev.	1.8809e-02	5.4620e-07	2.6948e-02	5.2339e-03	2.3513e-02	2.2940e-02	7.2748e-02

TABLE IV: Results of a GA search of the MLDC Challenge Data Set 1.1.1b.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Recovered Values							
Top Organism	0.5014	3.000356878914	-5.7524e-02	4.6219	1.8776	1.2847	6.0208
Uncertainties							
FIM Uncertainty	0.0186	5.2851e-07	2.5571e-02	5.1013e-03	2.3263e-02	2.2229e-02	7.0484e-02

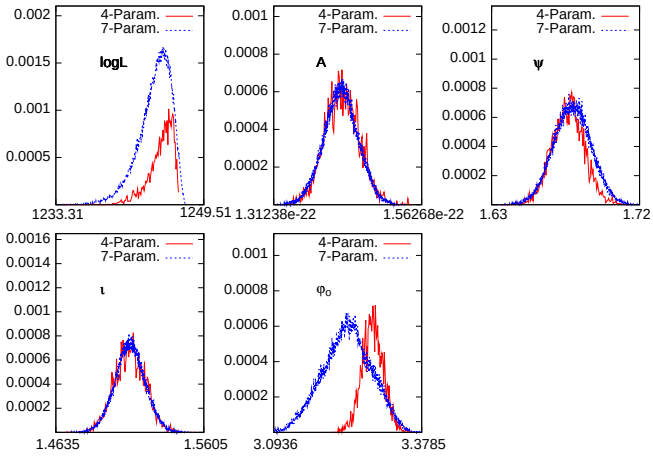

FIG. 4: Histograms of the extrinsic parameter values in the sampling phase of a BAM search of a verification binary in MLDC Challenge Data Set 1.1.2. One run used the *exact* frequency and sky position information, searching over only 4 parameters, while the other performed a standard 7 parameter search.

quency sources) on the MacBook Pro. The final step for the GA consisted of runs with 25,000 steps in the chain and took between 10

E. MLDC 1.1.3

In this challenge 20 resolvable binaries were placed at random across the LISA band. Both the BAM algorithm and the GA divided up the LISA band into 500 windows of equal size. The initial runs were performed on a supercomputer cluster with 3.2GHz Intel Pentium 4 processors.

For the BAM algorithm the windows each took an average of about 1 hour of processing time to perform the search, with 50,000 steps in the chains. The first of the criteria for candidate sources was that the SNR needed to be above 4.5 to continue in the search (please see [5] for a discussion of the false positive levels for the BAM algorithm). This cut-off left 26 possible sources found in the first pass. With those candidate sources a second template was sent looking in the same window with a different starting seed. These runs consisted of 100,000 steps and took about 2 hours per window on the cluster. After this search there were only 19 candidate sources left. The last step in the search was a sampling step of 500,000 steps per source to provide histograms for analysis. These runs took 12 minutes on the MacBook Pro. There results are given in Table X.

The GA took about 20 minutes (on average) per window to perform the search, which consisted of 25,000 iterations per window. Again, a cut-off criteria was established at SNR > 4.5. Candidate sources were then searched for again using new seed parameters. This cut the candidate pool down to

F. MLDC 1.1.4

For this challenge set, only the BAM algorithm was used. Unlike the previous searches, here it was used hierarchically. An initial run was performed searching the entire frequency range of the data looking for only 5 sources. The purpose of this initial run is to pick off the brightest sources in the data stream so that in the next step, when the data is divided up in to separate frequency windows, the bright sources from one window can be accounted for in nearby windows. This initial run took 1.25 hours on the 1.83GHz MacBook Pro. For the succeeding runs, the data stream was separated into five snippets with windows of acceptance 3μHz in width and wings (acting as a buffer against edge effects) 0.91μHz in width (please see [5] for a full description on exactly

TABLE V: Results of a BAM search of the MLDC Challenge Data Set 1.1.1c. An asterisk (*) denotes parameter uncertainties with a multimodal histogram (see Figure 3).

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Recovered Values							
Mode	4.038e-01	1.057116567991e+01	-1.1906e-01	4.6654e+00	1.1294e+00	4.8558e-01	1.9583e+00
Mean	4.227e-01	1.057116577861e+01	-1.1758e-01	4.6651e+00	1.1050e+00	2.0026e-01	2.2932e+00
Uncertainties							
Fisher	1.3858e-01	5.6136e-07	1.2947e-02	2.2771e-03	1.5070e+00	7.0556e-01	3.0179e+00
Chain	2.4888e-02	3.4276e-07	5.7007e-03	6.1389e-04	1.3416e-01	2.8290e-01	2.6348e-01

TABLE VI: Results of a GA search of the MLDC Challenge Data Set 1.1.1c

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Recovered Values							
Top Organism	2.032e-01	1.057116503906e-02	-1.24037e-01	4.6646e+00	4.2757e+00	1.5799e+00	2.0800e+00
Uncertainties							
Fisher	1.8503e-02	2.5481e-06	6.1393e-03	5.0830e-03	1.0830e-02	4.4636e-02	2.6975e-01

how the wings provide this buffer and other aspects of multiple source searching using BAM). Sources that are discovered in the windows of acceptance are kept, those found in the wings are disregarded. In the hierarchical searches, first one searcher is sent off to look for a source, and after a set number of steps in the chain the value of the evidence is recorded and a second searcher is added to the search. If, after a set number of steps the evidence does not show that the fit has improved enough the search is ended and the results of the second searcher are discarded. If the evidence warrants keeping the second searcher, then a third searcher is added and the search continues (up to a maximum of 5 searchers in this particular run).

In the first run over the divided data stream, there was a search for 6 sources in each of the 5 windows. Here the searches were performed using nodes on the same supercomputer cluster discussed in the previous subsection. The windows each took about 2.5 hours of processing time to perform the (hierarchical) search, with $135,000$ steps in the chains. The starting points of the chains included the 5 previously found sources if they resided inside the data snippet being searched. If they were located outside, their signal was subtracted from the data stream to lessen edge effects inside the snippet being searched. After this step, the algorithm had isolated 26 candidate sources.

The next run over the divided data stream (using the same 5 windows), was a search for up to 8 sources in each of the 5 windows. To improve the chances of finding sources, 5 different starting seeds for each window we run in parallel on the supercomputer cluster. These runs consisted of up to $300,000$ steps in the chains (all runs were stopped by the evidence criteria before reaching this mark). Here the SNR cut-off was relaxed for sources that occurred in separate searches of the same window. This led to the inclusion of two sources that had SNRs between 4 and 5. Results from parallel chains were merged and duplicates discarded. After this step, the algorithm had isolated 43 candidate sources.

The last step is to perform an extended 7 parameter sampling phase to obtain the PDFs for each of the sources. This was performed on a desktop 3.2GHz Dell Pentium 4 machine. It contained $1,000,000$ steps in the chain and took 40 hours to run. However, due to the deadline of the MLDC these histograms have yet to be analyzed. They will be made available in the next week. The results listed in Table XIII were taken from an exploratory sampling phase run ($N = 100,000$).

G. MLDC 1.1.5

This search over a restricted frequency range (30μHz) with a large number of sources (30^+), tests an algorithms ability to deal with very high source densities. As in Challenge 1.1.4, only the BAM algorithm was used in searching this data stream. The first hierarchical search looked for 8 sources over the entire data stream using $200,000$ steps in the search. This search was performed on the Dell desktop computer described above in 5 hours.

In the next search, the data stream was divided into six windows which were each searched for up to 8 sources. These runs were performed on the supercomputer cluster and used 3 different starting seeds. The evidence was used to stop the search process if increasing the number of searchers did not provide enough benefit to the overall fit before that limit. While most stopped after reaching 8 sources, many of these were found in the wings so that the number of candidates found in the acceptance windows of the searches only numbered 27. At the end of this round there were 27 candidate sources. Another run was attempted in which the algorithm could search for up to 12 sources per window. This run did not produce

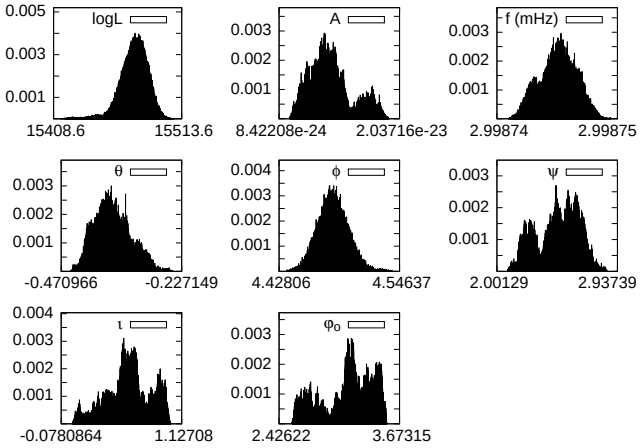

FIG. 5: Histograms of the parameters for one of the sources found in the MLDC 1.1.5. It shows secondary peaks that may suggest the presence of another source.

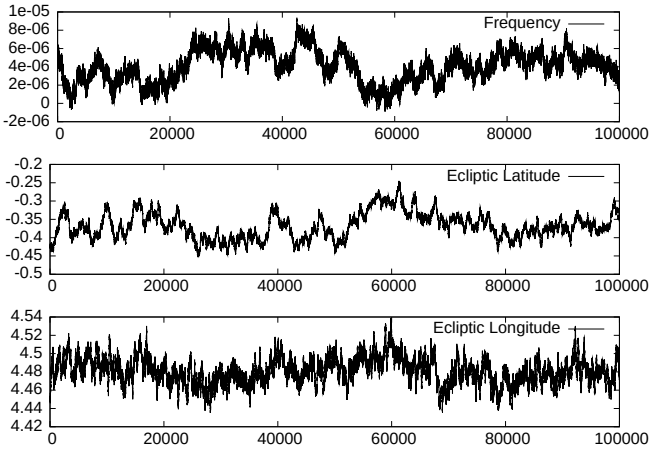

FIG. 6: Chain values for frequency, ecliptic latitude and longitude used in creating the histogram show in Figure 5. They appear to be exhibiting multi-modal behavior.

any more viable candidates, in part due to the analysis method used to study the chains. Currently the candidate source parameters are chose by taking the average values of the chains in that sampling phase of the search. However, if there are other sources nearby the chain picks up secondary modes, and average ends up being a blend of the two candidate sources. This is more of a problem for low SNR sources, and presents a limit of the current effectiveness of the BAM algorithm. We intend to move to analyzing the modes of the histograms of the output chains to determine the presence and parameter values for sources in the data stream.

The last step here, as in Challenge 1.1.4, is to perform an extended 7 parameter sampling phase. This was performed on a desktop 3.2GHz Dell Pentium 4 machine. It contained $1,000,000$ steps in the chain and took 22 hours to run. Again, due to the deadline of the MLDC these histograms have yet to be analyzed. They will be made available in the next week. The results listed in Table XVII are from an exploratory sampling phase run ($N = 100,000$).

The sampling phase in this situation is a bit premature, as more searches would possibly find more candidates. For example, Figure 5 shows the histogram of one candidate source during the exploratory sampling phase. Figure 6 shows three of the parameter chains for this source to verify if those secondary peaks were an artifact of the initial chain location (before moving to its 'burnt-in' values). There is the possibility that these secondary peaks are actually another source that the chain is transitioning to during the run, but it will take a longer run to establish how likely this is. However, due to the deadline for the MLDC this was performed to ensure full 7 parameter search of these candidate sources.

[1] P. Bender *et al.*, *LISA Pre-Phase A Report*, (1998).

[2] P. Jaranowski, A. Krolak & B. F. Schutz, Phys. Rev. D**58** 063001 (1998).

[3] N.J. Cornish & J. Crowder, Phys. Rev. D**72** 043005 (2005).

[4] J. Crowder & N.J. Cornish, & J.L. Reddinger Phys.Rev. D **73** 063011 (2006).

[5] J. Crowder & N.J. Cornish, astro-ph/0611546 (2006).

[6] L. J. Rubbo, N. J. Cornish & O. Poujade, Phys. Rev. D**69** 082003 (2004).

[7] N.J. Cornish & T. Littenberg, *in preparation* (2006).

TABLE VII: Results of BAM searches of the MLDC Challenge Data Set 1.1.2. An asterisk (*) denotes parameter uncertainties with a multimodal histogram.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Mode	9.446e-01	5.211353581480e-01	-1.4004e-01	1.0053e-01	3.1227e+00	-7.5823e-02	7.6655e-01
Mean	1.185e+00	5.211345497770e-01	-6.4898e-02	1.5041e+00	1.5980e+00	-9.5271e-02	2.9631e+00
FIM Uncertainty	4.6549e-01	2.2273e-06	1.2490e-01	1.0721e-01	1.5170e-01	1.4159e-01	3.7567e-01
Chain Std. Dev.	4.0020e-01	2.6204e-06	1.6571e-01	2.5294e+00	9.4380e-01	6.8372e-01*	1.7750e+00*
Mode	4.346e-01	1.767879679000e+00	-6.1599e-01	4.1320e+00	2.5133e-01	-9.1432e-01	4.1720e+00
Mean	5.371e-01	1.767879994071e+00	-6.1628e-01	4.1310e+00	1.3196e+00	-3.7942e-02	2.8691e+00
FIM Uncertainty	1.761e-01	2.7943e-06	7.4320e-02	9.2602e-02	3.8996e-01	3.1394e-01	7.17333e-01
Chain Std. Dev.	9.6139e-02	9.1801e-07	1.6540e-02	1.3010e-02	9.1283e-01*	6.5005e-01*	1.7482e+00*
Mode	1.000e+00	1.777716016338e+00	-2.3212e-01	4.0972e+00	7.8800e-01	1.9565e+00	4.0410e+00
Mean	1.001e+00	1.777716079004e+00	-2.2814e-01	4.0974e+00	7.9154e-01	1.9631e+00	4.0157e+00
FIM Uncertainty	4.0510e-02	6.7164e-07	2.3858e-02	7.9555e-03	3.1544e-02	2.9406e-02	8.9278e-02
Chain Std. Dev.	4.1287e-02	7.1910e-07	2.5567e-02	8.1014e-03	3.0848e-02	3.0382e-02	9.2041e-02
Mode	4.732e-01	1.874147206840e+00	-1.2825e-01	4.6429e+00	4.7920e-01	1.6413e+00	4.6508e+00
Mean	4.733e-01	1.874147566079e+00	-1.2560e-01	4.6434e+00	4.8129e-01	1.6419e+00	4.5914e+00
FIM Uncertainty	2.9768e-02	1.4560e-06	6.7540e-02	1.7717e-02	3.3053e-02	3.2866e-02	1.6151e-01
Chain Std. Dev.	3.0113e-02	1.5526e-06	7.2513e-02	1.7641e-02	3.2992e-02	3.3573e-02	1.6867e-01
Mode	1.425e+00	1.987575354250e+00	6.5675e-01	2.9664e+00	1.6784e+00	1.5124e+00	3.2361e+00
Mean	1.426e+00	1.987575337543e+00	6.5709e-01	2.9685e+00	1.6793e+00	1.5121e+00	3.2343e+00
FIM Uncertainty	2.9061e-02	4.0644e-07	7.6407e-03	9.6206e-03	1.1263e-02	9.9902e-03	4.7766e-02
Chain Std. Dev.	2.9158e-02	4.0646e-07	7.3629e-03	9.6400e-03	1.1473e-02	9.9452e-03	4.7422e-02
Mode	5.050e-01	2.004086341928e+00	1.8962e-01	4.7636e+00	2.4316e+00	-5.3177e-01	4.9135e+00
Mean	5.788e-01	2.004086263223e+00	1.9465e-01	4.7640e+00	1.7436e+00	-8.3703e-02	3.4594e+00
FIM Uncertainty	2.6564e-01	1.0874e-06	4.3217e-02	1.7223e-02	1.6835e+00	8.4265e-01	3.3843e+00
Chain Std. Dev.	6.4668e-02	5.5374e-07	2.0784e-02	5.4240e-03	7.6763e-01*	5.1307e-01*	1.9328e+00*
Mode	8.111e-02	2.351156313760e+00	-1.4704e-01	4.7463e+00	1.8851e-02	3.1414e+00	3.2421e+00
Mean	9.343e-02	2.351156859693e+00	-1.2701e-01	4.7499e+00	1.5794e+00	3.0671e+00	3.1399e+00
FIM Uncertainty	5.3830e+00	2.1833e-06	9.5491e-02	1.9625e-02	1.0082e+04	7.6494e+02	2.0164e+04
Chain Std. Dev.	2.1789e-02	2.6663e-06	1.0618e-01	2.5913e-02	9.2071e-01	5.8994e-01*	1.8311e+00*
Mode	1.133e-01	2.355954298540e+00	-1.5993e-01	4.5845e+00	2.9782e+00	-2.2526e-01	5.5293e-01
Mean	1.396e-01	2.355954506177e+00	-1.6128e-01	4.5830e+00	1.7433e+00	-5.6121e-02	2.7716e+00
FIM Uncertainty	4.055e-01	2.2910e-06	1.49574e-01	7.0799e-02	1.5792e+01	6.71445e+00	3.1624e+01
Chain Std. Dev.	3.5075e-02	1.5956e-06	6.0006e-02	1.6619e-02	9.4647e-01	6.6074e-01*	1.8505e+00*
Mode	1.213e-01	2.489979178970e+00	-4.1881e-01	4.4755e+00	1.9541e+00	3.1616e+00	1.4200e+00
Mean	1.374e-01	2.489979043560e+00	-4.1747e-01	4.4781e+00	1.5372e+00	3.0944e+00	3.0789e+00
FIM Uncertainty	1.2564e+01	2.3023e-06	4.2631e-02	1.3251e-02	3.9612e+04	1.9116e+03	7.9224e+04
Chain Std. Dev.	2.4043e-02	2.7564e-06	5.3253e-02	1.5039e-02	8.9853e-01	5.3235e-01*	1.8168e+00*
Mode	5.650e-01	3.062759644246e+00	-7.7787e-01	4.0461e+00	1.5579e+00	1.5107e+00	5.4793e+00
Mean	5.644e-01	3.062760069779e+00	-7.7683e-01	4.0450e+00	1.5588e+00	1.5131e+00	5.4561e+00
FIM Uncertainty	1.7675e-02	1.5016e-06	1.1712e-02	1.0883e-02	1.6885e-02	1.5384e-02	1.4813e-01
Chain Std. Dev.	1.7666e-02	1.4409e-06	1.1771e-02	1.0871e-02	1.6750e-02	1.5389e-02	1.4113e-01

TABLE VIII: Results of BAM searches of the MLDC Challenge Data Set 1.1.2, continued. An asterisk (*) denotes parameter uncertainties with a multimodal histogram.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Mode	8.673e-02	3.190093773464e+00	-1.5520e-02	4.6843e+00	1.3823e-01	1.9819e+00	1.8473e+00
Mean	1.395e-01	3.190093680554e+00	1.3771e-03	4.6851e+00	1.1884e+00	3.0780e+00	3.2701e+00
FIM Uncertainty	2.0355e-02	1.2695e-06	6.7222e-02	1.1792e-02	8.1349e-02	7.5696e-02	2.0931e-01
Chain Std. Dev.	3.8023e-02*	1.3774e-06	6.0138e-02	1.2369e-02	9.3478e-01*	9.4540e-01*	1.6713e+00*
Mode	1.577e-01	3.250187648712e+00	7.7369e-01	5.1883e+00	2.4881e+00	1.2335e+00	2.9782e+00
Mean	1.447e-01	3.250188057721e+00	7.6834e-01	5.1911e+00	2.0640e+00	3.0970e-01	3.1556e+00
FIM Uncertainty	3.8606e-02	6.2534e-06	5.7361e-02	8.1253e-02	1.8585e-01	1.7158e-01	8.4561e-01
Chain Std. Dev.	3.2074e-02	3.2077e-06	2.5859e-02	2.1351e-02	7.1873e-01*	1.0905e+00*	1.4728e+00*
Mode	4.987e-01	3.295565793992e+00	1.2997e-01	4.7808e+00	2.6219e+00	1.5383e+00	4.5220e+00
Mean	4.985e-01	3.295565730323e+00	1.2269e-01	4.7805e+00	2.6249e+00	1.5372e+00	4.5248e+00
FIM Uncertainty	1.5288e-02	7.0736e-07	2.9268e-02	5.1658e-03	1.5937e-02	1.5969e-02	7.5254e-02
Chain Std. Dev.	1.5383e-02	7.0983e-07	2.7251e-02	5.3284e-03	1.5928e-02	1.6052e-02	7.4714e-02
Mode	8.137e-01	3.328353061830e+00	-1.6774e-01	4.2889e-01	5.2705e-01	1.8708e+00	4.3935e+00
Mean	8.112e-01	3.328353058797e+00	-1.7003e-01	4.2878e-01	5.2525e-01	1.8724e+00	4.3917e+00
FIM Uncertainty	1.7396e-02	3.6425e-07	1.0372e-02	3.3663e-03	1.4423e-02	1.3717e-02	4.3466e-02
Chain Std. Dev.	1.7128e-02	3.6367e-07	9.9578e-03	3.3924e-03	1.3853e-02	1.3492e-02	4.2844e-02
Mode	1.059e+00	3.679871407882e+00	4.4179e-01	5.1457e+00	2.0946e+00	1.4179e+00	3.3199e+00
Mean	1.057e+00	3.679871384346e+00	4.4153e-01	5.1456e+00	2.0962e+00	1.4176e+00	3.3461e+00
FIM Uncertainty	1.5371e-02	5.5106e-07	6.7542e-03	2.2899e-03	8.0474e-03	7.9338e-03	6.1258e-02
Chain Std. Dev.	1.5457e-02	6.0096e-07	7.1896e-03	2.3173e-03	8.1003e-03	7.9602e-03	6.7611e-02
Mode	1.717e-01	4.146559153512e+00	4.5521e-02	4.7487e+00	2.0295e+00	9.7638e-01	1.5205e+00
Mean	2.352e-01	4.146559282315e+00	3.8297e-02	4.7487e+00	1.8470e+00	8.8491e-02	2.1025e+00
FIM Uncertainty	2.2337e-02	6.1668e-07	3.2665e-02	3.9735e-03	8.2041e-02	6.8609e-02	1.7462e-01
Chain Std. Dev.	4.3592e-02	6.2493e-07	3.1956e-02	4.0638e-03	6.3671e-01*	7.7103e-01*	1.4072e+00*
Mode	2.377e-01	4.974339979728e+00	-2.2221e-01	4.5055e+00	1.9641e+00	1.6028e+00	4.0387e+00
Mean	2.386e-01	4.974340112475e+00	-2.1444e-01	4.5059e+00	1.9685e+00	1.6040e+00	4.1081e+00
FIM Uncertainty	1.3930e-02	2.4138e-06	4.0226e-02	6.5891e-03	2.8456e-02	2.8421e-02	2.3748e-01
Chain Std. Dev.	1.4177e-02	2.5649e-06	4.3744e-02	6.9778e-03	2.8831e-02	2.9290e-02	2.5837e-01
Mode	2.428e+00	5.907385269160e+00	2.7095e-01	2.1014e+00	1.7396e+00	2.5891e+00	1.2339e+00
Mean	2.580e+00	5.907385276856e+00	2.7152e-01	2.1014e+00	1.8182e+00	2.9145e+00	9.3082e-01
FIM Uncertainty	8.1691e-02	5.9739e-08	8.3605e-04	2.1231e-04	1.2525e-01	5.9029e-02	2.5034e-01
Chain Std. Dev.	1.5075e-01	6.1869e-08	8.6675e-04	2.0981e-04	2.3378e-01*	2.6528e-01*	4.6766e-01*
Mode	9.960e-01	6.544361370904e+00	1.8163e-02	4.7551e+00	1.8564e+00	1.4568e+00	1.4263e+00
Mean	9.933e-01	6.544361321385e+00	2.2700e-02	4.7553e+00	1.8554e+00	1.4568e+00	1.4328e+00
FIM Uncertainty	1.4353e-02	2.8431e-07	1.3578e-02	1.1982e-03	7.2961e-03	7.2524e-03	3.2032e-02
Chain Std. Dev.	1.4370e-02	2.9398e-07	1.2108e-02	1.2040e-03	7.3021e-03	7.3043e-03	3.2708e-02
Mode	2.418e-01	8.505086396826e+00	-3.5703e-02	4.7513e+00	4.7754e-01	2.6123e+00	5.9941e+00
Mean	2.665e-01	8.505086519519e+00	-3.6195e-02	4.7512e+00	1.3285e+00	3.1160e+00	3.1994e+00
FIM Uncertainty	5.5566e-02	6.1100e-07	2.5739e-02	1.4547e-03	5.0805e-01	2.9640e-01	1.0202e+00
Chain Std. Dev.	2.8857e-02	5.4814e-07	2.2005e-02	1.4339e-03	8.5590e-01*	4.6549e-01	1.9945e+00*

TABLE IX: Results of GA searches of the MLDC Challenge Data Set 1.1.2.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Top Organism	2.063e+00	5.211327291438e-04	1.1280e-01	6.2064e+00	4.7615e+00	1.2026e+00	4.1648e+00
FIM Uncertainty	4.5836e-01	2.7657e-06	1.3349e-01	1.2123e-01	1.5320e-01	1.4314e-01	4.2270e-01
Top Organism	6.902e-01	1.767879480667e-03	-6.1513e-01	4.1387e+00	5.0069e+00	9.6948e-01	7.6392e-01
FIM Uncertainty	5.7631e-02	9.3375e-07	1.7147e-02	1.2704e-02	9.2807e-02	7.6300e-02	2.0208e-01
Top Organism	1.009e+00	1.777716343060e-03	-2.4774e-01	4.0988e+00	8.0476e-01	1.9535e+00	3.9270e+00
FIM Uncertainty	3.9908e-02	6.9445e-07	2.3513e-02	8.0228e-03	3.0335e-02	2.8368e-02	8.9310e-02
Top Organism	4.770e-01	1.874145420945e-03	-1.4189e-01	4.6484e+00	5.1878e+00	1.6437e+00	1.5708e+00
FIM Uncertainty	2.9647e-02	1.4840e-06	6.6203e-02	1.7698e-02	3.2687e-02	3.2461e-02	1.6450e-01
Top Organism	1.419e+00	1.987574920227e-03	6.5731e-01	2.9728e+00	4.8168e+00	1.5141e+00	3.1744e+00
FIM Uncertainty	2.8958e-02	4.0834e-07	7.7083e-03	9.7531e-03	1.1323e-02	9.9884e-03	4.7959e-02
Top Organism	4.970e-01	2.004086500000e-03	2.0018e-01	4.7583e+00	3.0503e+00	1.4237e-02	3.2396e+00
FIM Uncertainty	6.3778e-23	1.1820e-06	4.6282e-02	1.8505e-02	1.1023e+01	3.7104e+00	2.2028e+01
Top Organism	1.450e-01	2.351154418053e-03	-1.2224e-02	4.7292e+00	6.2484e+00	2.0594e+00	7.3631e-02
FIM Uncertainty	3.0969e-02	1.8690e-06	1.0071e-01	2.3127e-02	1.8263e-01	1.6276e-01	4.1768e-01
Top Organism	2.094e-01	2.355953106404e-03	-2.1629e-01	4.6065e+00	4.6204e+00	1.1144e+00	3.5342e+00
FIM Uncertainty	2.9552e-02	1.6103e-06	5.3300e-02	1.7247e-02	1.1468e-01	1.0338e-01	2.9076e-01
Top Organism	1.815e-01	2.489977175377e-03	-3.5890e-01	4.4684e+00	4.8597e+00	2.2181e+00	1.0772e+00
FIM Uncertainty	3.7134e-02	2.6737e-06	5.5970e-02	1.5102e-02	2.4656e-01	1.9755e-01	5.5326e-01
Top Organism	5.562e-01	3.062759500000e-03	-7.6771e-01	4.0481e+00	4.7053e+00	1.5178e+00	5.2938e+00
FIM Uncertainty	1.7355e-02	1.5031e-06	1.2014e-02	1.0828e-02	1.6727e-02	1.5313e-02	1.4747e-01
Top Organism	1.752e-01	3.190093912935e-03	-6.5194e-02	4.6646e+00	4.8774e+00	1.9636e+00	4.8845e+00
FIM Uncertainty	2.0027e-02	1.5763e-06	7.3440e-02	1.1797e-02	8.3141e-02	7.6979e-02	2.3350e-01
Top Organism	1.670e-01	3.250185412601e-03	7.5012e-01	5.1756e+00	2.5263e+00	1.2688e+00	3.0924e+00
FIM Uncertainty	1.8440e-02	3.1594e-06	2.6199e-02	2.0977e-02	7.3981e-02	6.9457e-02	3.3679e-01
Top Organism	4.903e-01	3.295565412326e-03	1.1970e-01	4.7799e+00	1.0544e+00	1.5383e+00	1.2150e+00
FIM Uncertainty	1.4988e-02	7.0194e-07	2.9425e-02	5.1221e-03	1.5868e-02	1.5896e-02	7.4961e-02
Top Organism	7.820e-01	3.328352824193e-03	-1.6485e-01	4.2635e-01	2.0912e+00	1.8796e+00	1.0717e+00
FIM Uncertainty	1.7204e-02	3.6971e-07	1.0674e-02	3.4239e-03	1.4967e-02	1.4195e-02	4.4532e-02
Top Organism	1.017e+00	3.679870639860e-03	4.3565e-01	5.1465e+00	5.2377e+00	1.4043e+00	3.1913e+00
FIM Uncertainty	1.5082e-02	5.4731e-07	6.8163e-03	2.3109e-03	8.3336e-03	8.1793e-03	6.1230e-02
Top Organism	2.303e-01	4.974342531733e-03	-2.6691e-01	4.5052e+00	5.1069e+00	1.6082e+00	3.5973e+00
FIM Uncertainty	1.3353e-02	2.4849e-06	3.5851e-02	6.8465e-03	2.8835e-02	2.8763e-02	2.4436e-01
Top Organism	2.685e-01	4.146559314331e-03	4.1417e-02	4.7486e+00	2.0737e+00	9.7657e-01	1.1780e+00
FIM Uncertainty	2.2571e-02	6.5817e-07	3.3704e-02	4.0149e-03	9.3972e-02	7.7403e-02	1.9807e-01
Top Organism	3.048e+00	5.907384878929e-03	2.6941e-01	2.1015e+00	5.8658e+00	2.3749e+00	2.4839e+00
FIM Uncertainty	3.3119e-02	6.2308e-08	8.5200e-04	2.1126e-04	1.9280e-02	1.3298e-02	3.9312e-02
Top Organism	9.083e-01	6.544360963128e-03	1.5340e-02	4.7553e+00	1.8532e+00	1.4562e+00	1.0908e+00
FIM Uncertainty	1.3220e-02	2.7939e-07	1.3725e-02	1.2169e-03	7.3543e-03	7.3034e-03	3.1674e-02
Top Organism	2.575e-01	8.505086917424e-03	-4.3671e-02	4.7506e+00	4.9187e+00	2.4664e+00	1.7917e+00
FIM Uncertainty	4.1383e-02	6.8826e-07	2.7268e-02	1.4665e-03	3.6114e-01	2.2554e-01	7.2783e-01

TABLE X: Results of BAM searches of the MLDC Challenge Data Set 1.1.3. An asterisk (*) denotes parameter uncertainties with a multimodal histogram.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Mode	3.793e-01	2.104223113656e+00	-1.0924e-01	4.6254e+00	2.0979e+00	1.9427e+00	2.7086e+00
Mean	3.739e-01	2.104223476487e+00	-1.1644e-01	4.6254e+00	2.1068e+00	1.9712e+00	2.6971e+00
FIM Uncertainty	2.9507e-02	1.1807e-06	5.6100e-02	1.2294e-02	5.4719e-02	5.0934e-02	1.5862e-01
Chain Std. Dev.	3.4053e-02	1.4025e-06	6.2647e-02	1.2907e-02	6.5954e-02	7.0386e-02	1.8899e-01
Mode	1.255e-01	2.290439359981e+00	9.9549e-03	4.6235e+00	2.6986e+00	2.1138e+00	3.0725e+00
Mean	1.622e-01	2.290439217754e+00	3.5218e-02	4.6278e+00	1.8454e+00	3.0857e+00	3.1165e+00
FIM Uncertainty	3.2879e-02	1.3276e-06	7.0104e-02	1.7374e-02	1.3337e-01	1.1707e-01	3.0021e-01
Chain Std. Dev.	4.0946e-02	1.4224e-06	8.1439e-02	1.7469e-02	8.8312e-01*	7.1303e-01	1.7628e+00*
Mode	2.785e-01	2.340924832643e+00	5.0014e-02	4.7141e+00	2.9424e+00	1.4558e+00	7.8962e-01
Mean	2.803e-01	2.340924924942e+00	4.8275e-02	4.7144e+00	2.9406e+00	1.4715e+00	7.9115e-01
FIM Uncertainty	2.2208e-02	1.4400e-06	7.3116e-02	1.8668e-02	3.8444e-02	3.8404e-02	1.6043e-01
Chain Std. Dev.	2.1374e-02	1.5576e-06	7.1684e-02	1.9673e-02	3.7442e-02	4.0259e-02	1.7449e-01
Mode	2.091e-01	2.486297453280e+00	-6.2026e-02	4.6549e+00	1.6965e-01	1.9923e+00	2.3186e+00
Mean	1.552e-01	2.486297089504e+00	-1.0359e-02	4.6538e+00	1.0287e+00	3.2428e+00	3.2297e+00
FIM Uncertainty	2.6568e-02	1.5300e-06	7.4779e-02	1.5569e-02	9.7319e-02	8.8971e-02	2.5271e-01
Chain Std. Dev.	4.5794e-02	1.6931e-06	9.4874e-02	1.6549e-02	9.6228e-01*	8.9774e-01*	1.5123e+00*
Mode	3.899e-02	2.808940447208e+00	-2.6138e-01	4.5139e+00	8.1996e-01	-1.3952e+00	1.1373e+00
Mean	7.222e-02	2.808941158274e+00	-1.2611e-01	4.5186e+00	1.5704e+00	-5.8301e-02	2.8200e+00
FIM Uncertainty	1.7856e-02	3.4541e-06	1.0330e-01	2.6483e-02	8.8765e-02	8.7864e-02	3.7982e-01
Chain Std. Dev.	3.0008e-02	3.8624e-06	2.0300e-01	3.2046e-02	8.5476e-01*	1.0659e+00*	1.6789e+00*
Mode	5.477e-02	2.825315108817e+00	2.1496e-02	4.6873e+00	2.7018e+00	3.3034e-02	2.1363e+00
Mean	6.230e-02	2.825315580264e+00	2.7677e-02	4.6821e+00	1.6939e+00	1.5050e-02	3.0068e+00
FIM Uncertainty	2.4703e-02	2.1392e-06	1.2454e-01	2.2563e-02	2.3512e-01	2.0618e-01	5.1273e-01
Chain Std. Dev.	1.6967e-02	2.6502e-06	1.0683e-01	2.6092e-02	8.6740e-01*	6.3398e-01	1.6891e+00*
Mode	7.209e-02	2.841841483794e+00	-6.5105e-02	4.6348e+00	2.5792e+00	2.6059e-01	9.4274e-02
Mean	8.726e-02	2.841841348338e+00	-7.4158e-02	4.6351e+00	1.7168e+00	-4.2026e-02	2.9813e+00
FIM Uncertainty	2.1656e-02	1.6790e-06	8.4643e-02	1.7118e-02	1.2292e-01	1.1324e-01	2.9442e-01
Chain Std. Dev.	2.4221e-02	1.8288e-06	7.2986e-02	1.8010e-02	8.6618e-01*	6.6975e-01	1.9771e+00*
Mode	2.266e-01	2.931340682809e+00	-1.3437e-01	4.7172e+00	3.3556e-01	1.8052e+00	3.3614e+00
Mean	2.257e-01	2.931341038869e+00	-1.1733e-01	4.7162e+00	3.3733e-01	1.8204e+00	3.3446e+00
FIM Uncertainty	1.8659e-02	1.8710e-06	7.2515e-02	1.2501e-02	4.9685e-02	4.7794e-02	2.1671e-01
Chain Std. Dev.	1.9372e-02	1.6901e-06	6.0161e-02	1.2668e-02	4.9025e-02	5.1750e-02	1.9952e-01
Mode	8.630e-02	3.190958369514e+00	-4.1294e-01	4.4675e+00	2.8965e+00	1.2302e-01	4.6747e+00
Mean	9.723e-02	3.190958032860e+00	-4.0429e-01	4.4669e+00	1.6006e+00	-7.8908e-03	3.2792e+00
FIM Uncertainty	2.9412e-01	3.6063e-06	1.1009e-01	7.6324e-02	1.7123e+01	7.0419e+00	3.4309e+01
Chain Std. Dev.	1.7080e-02	2.3739e-06	3.7376e-02	1.4628e-02	9.4298e-01*	5.3474e-01	1.7808e+00*
Mode	3.194e-01	3.499000287786e+00	-8.2423e-02	4.6553e+00	1.2452e+00	1.4122e+00	2.8282e-01
Mean	3.185e-01	3.499000304329e+00	-7.3837e-02	4.6554e+00	1.2514e+00	1.4103e+00	3.2735e-01
FIM Uncertainty	1.5404e-02	8.5775e-07	3.8378e-02	7.0027e-03	2.5518e-02	2.5085e-02	1.0153e-01
Chain Std. Dev.	1.5068e-02	9.4092e-07	4.1439e-02	7.2756e-03	2.6220e-02	2.5695e-02	5.3515e-01

TABLE XI: Results of BAM searches of the MLDC Challenge Data Set 1.1.3, continued. An asterisk (*) denotes parameter uncertainties with a multimodal histogram.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Mode	1.393e-01	3.689683486492e+00	-5.7523e-01	4.2819e+00	2.6076e-01	2.8875e+00	3.4306e+00
Mean	1.560e-01	3.689683330794e+00	-5.7193e-01	4.2816e+00	1.5142e+00	3.1307e+00	3.0670e+00
FIM Uncertainty	2.9410e-02	1.7867e-06	1.6779e-02	7.9980e-03	1.8656e-01	1.4479e-01	3.9619e-01
Chain Std. Dev.	2.4101e-02	1.7744e-06	1.7187e-02	8.2209e-03	9.4741e-01*	5.2452e-01	1.7351e+00*
Mode	2.225e-01	4.624094257619e+00	-5.3867e-01	4.3944e+00	1.3117e+00	1.3635e+00	2.5375e+00
Mean	2.284e-01	4.624094770205e+00	-5.3570e-01	4.3911e+00	1.3128e+00	1.3631e+00	2.5793e+00
FIM Uncertainty	1.5772e-02	2.3075e-06	1.2030e-02	1.5858e-02	4.5087e-02	4.2354e-02	2.5217e-01
Chain Std. Dev.	1.5645e-02	1.8225e-06	1.6338e-02	8.6480e-03	3.7575e-02	3.8697e-02	2.0200e-01
Mode	2.931e-01	4.634798192646e+00	-1.5237e-01	4.6186e+00	2.1388e+00	2.1534e+00	4.6066e+00
Mean	2.775e-01	4.634798218487e+00	-1.4880e-01	4.6199e+00	1.5099e+00	3.1616e+00	3.3305e+00
FIM Uncertainty	2.0539e-02	1.1155e-06	2.9670e-02	3.3584e-03	6.4868e-02	5.5784e-02	1.6418e-01
Chain Std. Dev.	3.7294e-02	1.0651e-06	2.8841e-02	3.4547e-03	7.7468e-01*	9.2177e-01*	1.5423e+00*
Mode	1.035e-01	4.734224549966e+00	-1.0006e-01	4.6586e+00	9.5755e-01	2.0778e+00	1.8775e+00
Mean	1.487e-01	4.734225094104e+00	-8.9743e-02	4.6578e+00	1.3923e+00	2.9180e+00	2.8118e+00
FIM Uncertainty	1.9044e-02	1.6632e-06	5.3336e-02	5.6858e-03	9.0929e-02	8.0836e-02	2.4465e-01
Chain Std. Dev.	3.4933e-02*	1.6184e-06	6.1367e-02	5.6963e-03	7.5415e-01*	8.0460e-01*	1.5109e+00*
Mode	8.765e-01	4.929274741731e+00	-1.2812e-01	4.5710e+00	1.6167e+00	2.0064e+00	2.8801e+00
Mean	8.768e-01	4.929274798077e+00	-1.2757e-01	4.5714e+00	1.6157e+00	2.0113e+00	2.8877e+00
FIM Uncertainty	1.9829e-02	3.6076e-07	1.8494e-03	7.3346e-03	2.0365e-02	1.7242e-02	5.3362e-02
Chain Std. Dev.	1.8735e-02	3.9731e-07	1.0824e-02	1.3061e-03	1.7018e-02	1.5359e-02	5.2622e-02
Mode	2.685e-01	5.232775734219e+00	3.4285e-02	4.6870e+00	1.8974e+00	1.3186e+00	3.2003e+00
Mean	2.691e-01	5.232775945536e+00	6.2067e-02	4.6875e+00	1.8968e+00	1.3136e+00	3.2050e+00
FIM Uncertainty	1.5228e-02	1.1586e-06	4.6202e-02	4.7379e-03	3.4178e-02	3.2865e-02	1.3163e-01
Chain Std. Dev.	1.5364e-02	1.3511e-06	5.0919e-02	4.7434e-03	3.3623e-02	3.3638e-02	1.4711e-01
Mode	6.027e-02	5.793258083446e+00	-4.1158e-01	5.0775e+00	2.6295e+00	2.0818e+00	4.4473e+00
Mean	7.199e-02	5.793257339450e+00	-4.1608e-01	5.0765e+00	1.5099e+00	2.3554e+00	3.7997e+00
FIM Uncertainty	5.5033e-02	3.8820e-06	4.4553e-02	2.8510e-02	1.6373e+00	1.0832e+00	3.3439e+00
Chain Std. Dev.	1.7953e-02*	2.3805e-06	3.2919e-02	1.0414e-02	1.2383e+00*	3.6834e-01*	6.8036e-01*
Mode	9.289e-02	5.793419849876e+00	-6.4093e-02	4.7085e+00	3.0976e+00	3.4003e+00	3.2044e+00
Mean	1.019e-01	5.793419893014e+00	-5.6543e-02	4.7077e+00	1.6684e+00	3.1200e+00	2.9860e+00
FIM Uncertainty	5.8161e+01	4.2549e-06	1.1445e-01	2.2618e-02	1.0622e+02	2.6912e+01	2.1249e+02
Chain Std. Dev.	1.5480e-02	1.4418e-06	5.3749e-02	5.4066e-03	9.2654e-01*	5.1006e-01	1.7305e+00*
Mode	1.298e-01	6.162265115665e+00	-1.3293e-01	4.6543e+00	8.0506e-01	1.4748e+00	7.2633e-01
Mean	1.308e-01	6.162265559425e+00	-4.9076e-02	4.6542e+00	8.1281e-01	1.4655e+00	7.8133e-01
FIM Uncertainty	1.3434e-02	2.6845e-06	6.7062e-02	8.1315e-03	5.2552e-02	5.2822e-02	2.8291e-01
Chain Std. Dev.	1.3871e-02	2.6284e-06	1.2389e-01*	8.8073e-03	5.8022e-02	6.3098e-02	6.5032e-01

TABLE XII: Results of a GA search of the MLDC Challenge Data Set 1.1.3.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Top Organism	3.133e-01	2.104235132768e+00	-4.3508e-01	4.6118e+00	3.7305e+00	2.0651e+00	4.8806e+00
FIM Uncertainty	3.5855e-02	2.1547e-06	4.6400e-02	1.5103e-02	1.0576e-01	9.2379e-02	2.8724e-01
Top Organism	1.668e-01	2.290439596498e+00	-2.4400e-02	4.6180e+00	2.4505e+00	2.3439e+00	2.5524e+00
FIM Uncertainty	5.2327e-02	1.3076e-06	7.2247e-02	1.5860e-02	5.1688e-01	3.7256e-01	1.0364e+00
Top Organism	1.105e-01	2.486296438031e+00	4.1082e-02	4.6533e+00	3.2806e+00	2.6507e+00	2.4005e+00
FIM Uncertainty	9.7435e-02	2.8905e-06	1.3623e-01	4.0690e-02	1.9591e+00	1.1941e+00	3.9400e+00
Top Organism	1.142e-01	2.808940270191e+00	-2.2765e-01	4.5220e+00	3.9851e+00	1.3928e+00	1.2119e+00
FIM Uncertainty	1.7910e-02	3.5516e-06	1.0658e-01	2.7425e-02	9.2509e-02	9.1472e-02	3.9191e-01
Top Organism	7.896e-02	2.825314898972e+00	-9.5874e-05	4.6857e+00	5.8705e+00	8.8352e-01	1.5216e+00
FIM Uncertainty	3.4512e-02	2.1995e-06	1.2473e-01	2.3294e-02	5.9013e-01	4.5203e-01	1.2029e+00
Top Organism	1.572e-01	2.841841322176e+00	-1.1064e-01	4.6273e+00	9.8175e-01	1.2272e+00	3.1906e+00
FIM Uncertainty	2.0286e-02	1.6917e-06	7.7133e-02	1.6403e-02	9.3178e-02	8.7777e-02	2.4953e-01
Top Organism	2.305e-01	2.931344882087e+00	-2.2286e-01	4.7129e+00	3.4759e+00	1.8162e+00	2.9451e+00
FIM Uncertainty	1.8661e-02	2.5050e-06	6.5798e-02	1.2586e-02	4.8448e-02	4.6602e-02	2.7385e-01
Top Organism	1.156e-01	3.190961533267e+00	-4.4773e-01	4.4559e+00	1.9120e+00	7.8540e-01	6.2202e+00
FIM Uncertainty	3.9770e-02	2.2444e-06	3.2569e-02	1.4299e-02	5.7886e-01	4.0859e-01	1.1771e+00
Top Organism	3.133e-01	3.499000988207e+00	-9.6785e-02	4.6550e+00	2.8247e+00	1.3744e+00	3.5379e+00
FIM Uncertainty	1.6102e-02	8.9589e-07	3.7918e-02	7.1760e-03	2.8628e-02	2.7922e-02	1.0846e-01
Top Organism	1.507e-01	3.689692195226e+00	-6.4173e-01	4.2588e+00	2.4427e+00	2.6507e+00	1.0743e+00
FIM Uncertainty	9.1491e-02	1.7949e-06	1.5266e-02	8.7181e-03	2.5529e+00	1.2107e+00	5.1132e+00
Top Organism	6.218e-02	4.624253000344e+00	-3.6825e-01	3.9464e+00	1.9417e+00	1.9098e-01	4.3043e+00
FIM Uncertainty	5.4226e-01	2.8466e-06	3.1662e-02	1.3398e-02	2.4032e+02	4.5524e+01	4.8063e+02
Top Organism	1.083e-01	4.634970829235e+00	-5.0310e-01	4.1813e+00	4.2779e+00	2.7979e+00	5.4882e+00
FIM Uncertainty	1.7064e-01	2.1207e-06	1.7755e-02	7.7838e-03	1.3624e+01	4.5409e+00	2.7272e+01
Top Organism	5.699e-02	4.734389902013e+00	-5.1873e-01	4.2718e+00	5.3700e+00	3.1203e+00	1.9776e+00
FIM Uncertainty	6.0486e+01	5.1112e-06	4.5231e-02	3.7378e-02	2.1661e+06	4.9749e+04	4.3322e+06
Top Organism	4.400e-01	4.929277705525e+00	-1.8969e-01	4.5724e+00	1.4218e+00	3.1415e+00	2.2128e+00
FIM Uncertainty	2.9982e+00	6.0128e-07	1.1422e-02	4.0531e-03	7.0509e+02	6.9100e+01	1.4102e+03
Top Organism	1.263e-01	5.232782222169e+00	2.1063e-01	4.6853e+00	1.6633e+00	5.8900e-01	3.0925e+00
FIM Uncertainty	5.8163e-02	1.8618e-06	3.3492e-02	5.1116e-03	1.3429e+00	7.5102e-01	2.6903e+00
Top Organism	5.532e-02	5.793258184489e+00	-4.0291e-01	5.0711e+00	5.5655e+00	2.8015e+00	2.7235e+00
FIM Uncertainty	1.7053e-01	3.1634e-06	3.1770e-02	9.9352e-03	2.6907e+01	8.9914e+00	5.3785e+01
Top Organism	9.025e-02	5.793420997314e+00	-1.0235e-01	4.7076e+00	7.0582e-01	3.0123e+00	4.8215e+00
FIM Uncertainty	1.1643e+00	2.0303e-06	6.0262e-02	5.3601e-03	7.6733e+02	9.9669e+01	1.5346e+03
Top Organism	1.392e-01	6.162265514609e+00	-1.3322e-01	4.6550e+00	5.5268e+00	1.4834e+00	3.8534e+00
FIM Uncertainty	1.3452e-02	2.7209e-06	6.6754e-02	8.1808e-03	5.3309e-02	5.3565e-02	2.8671e-01

TABLE XIII: Results of a search of the MLDC Challenge Data Set 1.1.4. Note: Multi-modal behavior of the chains have not been explicitly marked due to time constraints.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Mode	7.081e-01	3.000357101780e+00	-9.9898e-02	4.6415e+00	3.3311e-01	1.4549e+00	2.8513e+00
Mean	7.042e-01	3.000356998679e+00	-9.5451e-02	4.6412e+00	3.3238e-01	1.4570e+00	2.8651e+00
FIM Uncertainties	1.7249e-02	5.4767e-07	2.0743e-02	4.4380e-03	1.2075e-02	1.1955e-02	6.1277e-02
Chain Std. Dev.	1.7406e-02	3.6217e-07	2.0265e-02	4.3304e-03	1.0126e-02	1.1585e-02	3.4575e-02
Mode	1.408e-01	3.000459309968e+00	-1.4509e-01	4.6209e+00	9.5473e-01	9.2803e-01	1.6627e+00
Mean	1.402e-01	3.000459568573e+00	-1.2846e-01	4.6235e+00	9.3267e-01	9.0023e-01	1.7107e+00
FIM Uncertainties	9.7201e-02	1.3830e-06	5.7775e-02	1.2970e-02	4.0599e+00	1.9017e+00	8.1145e+00
Chain Std. Dev.	9.5220e-03	5.8764e-07	4.3415e-02	1.1198e-02	3.2678e-02	3.5765e-02	6.9258e-02
Mode	1.564e-01	3.000618608648e+00	-3.9038e-01	4.5336e+00	4.8125e-01	1.1146e+00	4.2410e+00
Mean	1.652e-01	3.000618623597e+00	-3.8379e-01	4.5303e+00	4.8072e-01	1.1127e+00	4.2452e+00
FIM Uncertainties	3.3837e-02	2.2640e-06	3.4307e-02	1.5443e-02	3.3970e-01	2.6042e-01	7.0964e-01
Chain Std. Dev.	1.4630e-02	6.6300e-07	2.1359e-02	1.4449e-02	2.9871e-02	5.3915e-02	2.8232e-02
Mode	4.922e-01	3.000765704967e+00	5.1859e-02	4.7457e+00	1.2898e+00	1.4601e+00	5.7019e+00
Mean	4.893e-01	3.000765538900e+00	3.5470e-02	4.7474e+00	1.2967e+00	1.4573e+00	5.7576e+00
FIM Uncertainties	1.7699e-02	6.7326e-07	3.4083e-02	6.2428e-03	1.7250e-02	1.7331e-02	7.6185e-02
Chain Std. Dev.	1.6654e-02	4.9409e-07	3.8641e-02	6.4906e-03	1.7871e-02	1.8769e-02	5.1431e-02
Mode	6.882e-01	3.001104242704e+00	3.0926e-01	4.8944e+00	1.4885e+00	1.2050e+00	1.1287e+00
Mean	6.919e-01	3.001104397911e+00	3.1408e-01	4.8950e+00	1.4880e+00	1.2003e+00	1.1245e+00
FIM Uncertainties	2.3531e-02	8.1524e-07	1.7074e-02	3.9844e-03	2.1948e-02	2.1994e-02	9.0884e-02
Chain Std. Dev.	2.0218e-02	5.2001e-07	1.2124e-02	3.6334e-03	1.8625e-02	1.7893e-02	4.6981e-02
Mode	2.030e-01	3.001311346972e+00	1.0241e+00	6.0433e+00	1.1202e+00	2.0192e+00	4.1827e-01
Mean	1.982e-01	3.001310209913e+00	1.0264e+00	6.0330e+00	1.1188e+00	2.0374e+00	4.0720e-01
FIM Uncertainties	2.9918e-01	2.8213e-06	1.3887e-02	3.4439e-02	2.5945e+01	8.4488e+00	5.1872e+01
Chain Std. Dev.	1.2916e-02	1.3272e-06	1.2162e-02	2.2000e-02	4.7446e-02	3.4364e-02	2.9574e-02
Mode	2.087e-01	3.001752714935e+00	-2.6612e-01	4.5345e+00	1.4196e+00	1.4893e+00	4.9915e+00
Mean	2.213e-01	3.001752682057e+00	-2.6845e-01	4.5319e+00	1.4333e+00	1.5012e+00	5.0090e+00
FIM Uncertainties	1.6980e-02	2.5079e-06	5.9294e-02	1.7045e-02	3.8824e-02	3.8599e-02	2.6436e-01
Chain Std. Dev.	1.6405e-02	5.9849e-07	2.7458e-02	1.4390e-02	3.1935e-02	3.1681e-02	3.3361e-02
Mode	7.291e-02	3.002553290976e+00	5.4908e-01	1.2462e+00	6.9988e-01	1.5555e+00	4.4472e+00
Mean	7.238e-02	3.002553661986e+00	6.0346e-01	1.2651e+00	6.9537e-01	1.5102e+00	4.4592e+00
FIM Uncertainties	2.2266e-02	1.4403e-05	1.8600e-01	7.3938e-02	2.7829e-01	2.7855e-01	1.4609e+00
Chain Std. Dev.	9.6983e-03	1.0098e-06	5.8841e-02	4.0228e-02	3.3076e-02	1.3077e-01	3.7582e-02
Mode	6.800e-01	3.002712708815e+00	-3.1040e-01	1.9549e+00	5.1322e-01	8.2998e-01	5.7651e+00
Mean	6.645e-01	3.002712757356e+00	-3.0699e-01	1.9554e+00	5.4355e-01	7.9200e-01	5.6892e+00
FIM Uncertainties	4.0441e-02	5.4889e-07	1.2164e-02	2.7919e-03	8.2300e-02	6.0320e-02	1.6907e-01
Chain Std. Dev.	2.7974e-02	4.2140e-07	9.1948e-03	2.4924e-03	3.8795e-02	4.9125e-02	6.4451e-02
Mode	6.210e-02	3.002987845177e+00	-2.8818e-01	4.7682e+00	8.1682e-02	1.4191e+00	2.6436e+00
Mean	7.633e-02	3.002989241883e+00	-2.8316e-01	4.7581e+00	5.1376e-01	1.4461e+00	3.5652e+00
FIM Uncertainties	1.5904e-01	1.9634e-05	5.1246e-01	6.5847e-02	3.6520e-01	5.1373e-01	3.0653e+00
Chain Std. Dev.	1.7332e-02	2.4004e-06	5.6155e-02	4.5777e-02	6.7302e-01	5.8004e-02	1.4357e+00
Mode	1.305e-01	3.003013338850e+00	-5.8297e-01	4.4396e+00	1.2704e+00	1.6225e+00	4.3775e+00
Mean	1.335e-01	3.003014737248e+00	-5.8698e-01	4.4097e+00	1.2867e+00	1.6211e+00	4.4492e+00
FIM Uncertainties	1.6002e-01	1.3031e-05	2.0851e-01	5.7562e-02	1.7648e-01	2.4274e-01	1.7951e+00
Chain Std. Dev.	1.6248e-02	1.2922e-06	2.7931e-02	4.1095e-02	3.1305e-02	3.2540e-02	7.3190e-02

TABLE XIV: Results of a search of the MLDC Challenge Data Set 1.1.4, continued.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Mode	6.309e-01	3.003353398900e+00	4.4517e-02	4.6900e+00	7.3830e-02	1.3608e+00	2.8190e-01
Mean	6.324e-01	3.003353523445e+00	4.8216e-02	4.6897e+00	7.8799e-02	1.3588e+00	3.0047e-01
FIM Uncertainties	1.8071e-02	5.0945e-07	2.4129e-02	4.6985e-03	1.5154e-02	1.4956e-02	5.8958e-02
Chain Std. Dev.	1.9602e-02	3.5565e-07	2.2704e-02	4.5446e-03	3.3079e-02	1.5147e-02	6.9091e-02
Mode	1.206e-01	3.003653004932e+00	-1.3563e-01	4.6530e+00	4.9684e-01	1.8460e+00	4.6596e+00
Mean	1.133e-01	3.003653378960e+00	-5.4576e-02	4.6497e+00	4.6420e-01	1.8153e+00	4.6276e+00
FIM Uncertainties	1.6899e-02	3.6391e-06	1.3270e-01	2.2461e-02	7.3984e-02	7.2568e-02	3.8745e-01
Chain Std. Dev.	1.2137e-02	8.3107e-07	1.2690e-01	2.2128e-02	3.5335e-02	4.9739e-02	3.3837e-02
Mode	2.912e-01	3.003896916868e+00	8.2886e-02	4.7963e+00	1.2138e+00	1.7279e+00	2.5545e+00
Mean	2.925e-01	3.003897426762e+00	8.0044e-02	4.7955e+00	1.2023e+00	1.7389e+00	2.5161e+00
FIM Uncertainties	1.6790e-02	1.0766e-06	4.7645e-02	1.0164e-02	2.9584e-02	2.9236e-02	1.2008e-01
Chain Std. Dev.	1.7472e-02	6.8800e-07	4.1690e-02	9.9763e-03	3.9613e-02	2.4656e-02	6.2479e-02
Mode	2.118e-01	3.004445936954e+00	-1.6945e-01	4.6228e+00	3.9760e-01	2.1920e+00	7.9976e-01
Mean	2.172e-01	3.004445890405e+00	-1.7146e-01	4.6223e+00	4.2031e-01	2.1605e+00	8.1748e-01
FIM Uncertainties	3.9578e-02	1.8665e-06	6.3211e-02	9.3964e-03	2.0007e-01	1.6619e-01	4.5269e-01
Chain Std. Dev.	1.0811e-02	7.0325e-07	3.1104e-02	8.3147e-03	3.1874e-02	4.9104e-02	3.8242e-02
Mode	2.932e-02	3.004505933780e+00	-1.2832e-01	4.3425e+00	6.6073e-01	1.8477e+00	4.9456e+00
Mean	3.596e-02	3.004502275992e+00	-2.5386e-01	4.2720e+00	6.1604e-01	1.7377e+00	4.8807e+00
FIM Uncertainties	2.4001e-02	7.1307e-06	2.4115e-01	5.2541e-02	1.9078e-01	1.9429e-01	7.1134e-01
Chain Std. Dev.	1.5174e-02	3.4665e-06	1.4099e-01	1.3263e-01	4.3545e-02	1.0283e-01	7.8870e-02
Mode	1.068e-01	3.004180911645e+00	-2.0375e-01	4.5397e+00	1.4197e+00	1.8251e+00	4.0841e+00
Mean	1.153e-01	3.004180832860e+00	-2.5468e-01	4.5359e+00	1.3776e+00	1.8000e+00	4.1134e+00
FIM Uncertainties	1.9922e-02	4.9497e-06	8.3031e-02	2.4878e-02	1.1643e-01	1.0994e-01	5.6234e-01
Chain Std. Dev.	1.5192e-02	1.2127e-06	5.5973e-02	2.4695e-02	5.9277e-02	5.0054e-02	4.0872e-02
Mode	1.642e-01	3.004741973672e+00	-1.9271e-01	4.6605e+00	9.8475e-01	2.2106e+00	4.6825e+00
Mean	1.687e-01	3.004741827977e+00	-1.8528e-01	4.6630e+00	9.8909e-01	2.2479e+00	4.6710e+00
FIM Uncertainties	2.4615e-02	1.7641e-06	5.9572e-02	9.7409e-03	1.2446e-01	1.0665e-01	3.0542e-01
Chain Std. Dev.	1.1356e-02	5.6740e-07	3.0833e-02	9.5475e-03	3.7238e-02	4.3908e-02	4.4816e-02
Mode	3.626e-01	3.005335758620e+00	-1.0058e-01	4.6561e+00	7.8540e-03	1.9148e+00	1.6057e+00
Mean	3.641e-01	3.005335038650e+00	-9.0097e-02	4.6560e+00	6.2974e-01	1.9009e+00	2.8984e+00
FIM Uncertainties	2.0086e-02	8.6812e-07	3.8183e-02	6.7498e-03	3.5801e-02	3.4057e-02	1.1562e-01
Chain Std. Dev.	1.6988e-02	1.0465e-06	4.5386e-02	6.9808e-03	7.4302e-01	2.8493e-02	1.5716e+00
Mode	1.502e-01	3.005531793788e+00	-2.0778e-01	4.5886e+00	1.2933e+00	1.1883e+00	2.1955e+00
Mean	1.468e-01	3.005531681644e+00	-2.1295e-01	4.5901e+00	1.2690e+00	1.1721e+00	2.2269e+00
FIM Uncertainties	1.9342e-02	2.1873e-06	6.4183e-02	1.6926e-02	1.0113e-01	9.4475e-02	2.9448e-01
Chain Std. Dev.	1.3386e-02	7.2200e-07	4.6476e-02	1.4771e-02	3.9992e-02	4.6542e-02	4.0588e-02
Mode	1.700e-01	3.006377926350e+00	-1.5745e-01	4.6942e+00	2.6787e-01	1.2700e+00	2.1321e+00
Mean	1.699e-01	3.006378050530e+00	-1.3863e-01	4.6902e+00	2.5769e-01	1.2393e+00	2.0078e+00
FIM Uncertainties	2.0755e-02	1.3581e-06	7.7380e-02	1.5081e-02	8.2797e-02	7.7351e-02	2.1763e-01
Chain Std. Dev.	1.4175e-02	6.3265e-07	5.0844e-02	1.4726e-02	3.6577e-02	5.3574e-02	1.0956e-01
Mode	2.243e-01	3.006632876523e+00	-5.3005e-03	4.7257e+00	1.3702e+00	1.9146e+00	5.5999e+00
Mean	2.240e-01	3.006633533370e+00	7.7047e-03	4.7279e+00	1.3158e+00	1.9057e+00	5.6134e+00
FIM Uncertainties	1.9956e-02	1.1952e-06	6.2501e-02	1.1175e-02	4.9069e-02	4.7824e-02	1.6142e-01
Chain Std. Dev.	1.6493e-02	7.4363e-07	6.0542e-02	1.0425e-02	5.3545e-02	4.0686e-02	5.3698e-02

TABLE XV: Results of a search of the MLDC Challenge Data Set 1.1.4, continued.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Mode	2.094e-01	3.006715916902e+00	-9.5010e-01	2.3985e+00	1.0762e+00	1.0840e+00	3.3733e+00
Mean	2.093e-01	3.006716170217e+00	-9.4809e-01	2.3973e+00	1.0645e+00	1.0579e+00	3.3810e+00
FIM Uncertainties	3.1323e-02	2.3625e-06	1.4745e-02	2.5855e-02	1.6907e-01	1.3587e-01	4.4743e-01
Chain Std. Dev.	1.5277e-02	1.0065e-06	1.0668e-02	1.8273e-02	4.1177e-02	4.9450e-02	6.7206e-02
Mode	2.100e-01	3.007456278858e+00	3.4057e-02	4.5709e+00	3.2167e-01	1.0748e+00	5.3201e+00
Mean	2.210e-01	3.007456146715e+00	3.7992e-02	4.5732e+00	3.2332e-01	1.1165e+00	5.3892e+00
FIM Uncertainties	2.4632e-02	1.3079e-06	5.2581e-02	8.8862e-03	1.0666e-01	9.1826e-02	2.4400e-01
Chain Std. Dev.	1.6208e-02	6.2368e-07	6.0239e-02	1.0307e-02	3.7251e-02	3.9257e-02	6.8277e-02
Mode	8.089e-01	3.007961728197e+00	-4.1605e-02	4.7081e+00	1.1135e+00	2.0308e+00	5.0185e+00
Mean	8.056e-01	3.007961727838e+00	-3.8193e-02	4.7081e+00	1.1187e+00	2.0386e+00	5.0354e+00
FIM Uncertainties	2.3016e-02	2.9225e-07	1.5535e-02	2.4997e-03	2.6569e-02	2.3271e-02	6.0497e-02
Chain Std. Dev.	1.9205e-02	2.6134e-07	1.6137e-02	2.4950e-03	1.6640e-02	1.8027e-02	3.2493e-02
Mode	3.643e-01	3.008351311580e+00	1.0002e-02	4.7461e+00	1.2078e+00	2.2808e+00	6.1901e+00
Mean	3.658e-01	3.008351490224e+00	-2.2245e-02	4.7470e+00	1.2068e+00	2.2702e+00	6.1402e+00
FIM Uncertainties	2.7026e-02	4.4669e-07	2.5772e-02	4.4944e-03	7.5326e-02	6.2077e-02	1.5605e-01
Chain Std. Dev.	1.2373e-02	4.7383e-07	2.9069e-02	4.5729e-03	2.6684e-02	2.6705e-02	6.5259e-02
Mode	1.509e-01	3.008550790577e+00	4.2047e-01	5.0143e+00	7.4056e-01	1.9434e+00	6.2392e+00
Mean	1.627e-01	3.008552416360e+00	4.3789e-01	5.0099e+00	7.2726e-01	1.8957e+00	3.7412e+00
FIM Uncertainties	1.8610e-02	2.5985e-06	3.6393e-02	1.9029e-02	6.4136e-02	6.1567e-02	2.9972e-01
Chain Std. Dev.	1.5945e-02	1.3227e-06	2.4620e-02	1.6974e-02	3.1267e-02	4.5472e-02	2.9861e+00
Mode	7.956e-02	3.009030996476e+00	2.5295e-02	1.5370e+00	3.5565e-01	1.7807e+00	4.3561e+00
Mean	7.716e-02	3.009031517252e+00	4.1414e-02	1.5139e+00	3.5436e-01	1.7587e+00	4.3449e+00
FIM Uncertainties	1.8906e-02	6.0621e-06	1.4990e-01	3.4446e-02	1.6234e-01	1.5296e-01	6.8348e-01
Chain Std. Dev.	8.4930e-03	1.5395e-06	9.0627e-02	3.1099e-02	4.4042e-02	3.6669e-02	2.3747e-02
Mode	2.020e-01	3.009076955918e+00	1.2553e-01	4.7418e+00	1.1666e+00	1.9749e+00	1.9472e+00
Mean	2.008e-01	3.009077690875e+00	1.2661e-01	4.7395e+00	1.1949e+00	1.9873e+00	1.9842e+00
FIM Uncertainties	2.3283e-02	1.2636e-06	5.5065e-02	1.1605e-02	1.1260e-01	1.0130e-01	2.5532e-01
Chain Std. Dev.	1.3526e-02	1.3937e-06	5.0783e-02	1.0902e-02	4.9060e-02	3.7717e-02	4.7532e-02
Mode	1.773e-01	3.009903829836e+00	1.0472e-02	4.6865e+00	5.8822e-01	1.0630e+00	1.1938e-01
Mean	1.773e-01	3.009903907314e+00	-3.8862e-03	4.6834e+00	5.9396e-01	9.7860e-01	3.7554e-01
FIM Uncertainties	2.3014e-02	1.0484e-06	6.0866e-02	1.0024e-02	1.0502e-01	9.3682e-02	2.2995e-01
Chain Std. Dev.	1.8165e-02	5.5390e-07	5.0457e-02	1.0109e-02	2.9829e-02	8.1486e-02	1.2839e+00
Mode	1.666e-01	3.010133131744e+00	5.4977e-01	1.1435e+00	1.9799e-01	1.1699e+00	7.1721e-01
Mean	1.734e-01	3.010134199830e+00	5.4842e-01	1.1399e+00	1.6985e-01	1.0966e+00	7.2518e-01
FIM Uncertainties	2.4359e-02	2.2819e-06	3.0527e-02	1.6635e-02	1.1609e-01	1.0559e-01	3.2674e-01
Chain Std. Dev.	1.4913e-02	1.2879e-06	2.3623e-02	1.6566e-02	5.7503e-02	6.6460e-02	2.9938e-02
Mode	3.204e-01	3.011524732864e+00	5.2007e-01	5.0441e+00	7.8745e-02	8.4781e-01	9.2181e-01
Mean	3.201e-01	3.011524406555e+00	5.1784e-01	5.0437e+00	7.8890e-02	8.4929e-01	9.3693e-01
FIM Uncertainties	5.2449e-02	1.1950e-06	1.5028e-02	6.3676e-03	4.0368e-01	2.5943e-01	8.1968e-01
Chain Std. Dev.	1.4109e-02	6.1994e-07	9.7948e-03	5.5866e-03	2.5045e-02	4.1448e-02	3.5392e-02
Mode	1.304e-01	3.011805889766e+00	-1.2462e-01	4.6394e+00	9.0892e-01	1.5006e+00	5.6168e+00
Mean	1.275e-01	3.011805797794e+00	-5.4895e-02	4.6407e+00	9.5737e-01	1.4808e+00	5.5941e+00
FIM Uncertainties	1.5850e-02	2.6127e-06	1.0790e-01	2.0124e-02	6.3006e-02	6.3159e-02	2.8755e-01
Chain Std. Dev.	1.5714e-02	6.8303e-07	8.4026e-02	2.0810e-02	4.2593e-02	4.3596e-02	5.4242e-02

TABLE XVI: Results of a search of the MLDC Challenge Data Set 1.1.4, continued.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Mode	4.045e-01	3.012130683584e+00	-4.3840e-01	4.4274e+00	3.7009e-01	5.4884e-01	1.7642e+00
Mean	4.024e-01	3.012130581365e+00	-4.3850e-01	4.4276e+00	3.7452e-01	5.6960e-01	1.7678e+00
FIM Uncertainties	7.5271e-02	5.7859e-07	1.0359e-02	4.0766e-03	5.7597e-01	3.1538e-01	1.1521e+00
Chain Std. Dev.	1.7946e-02	4.8217e-07	9.2485e-03	3.8726e-03	2.5362e-02	6.3018e-02	3.7123e-02
Mode	1.160e-01	3.012254211983e+00	8.7832e-02	4.7649e+00	1.2973e+00	9.7729e-01	7.9659e-01
Mean	1.156e-01	3.012253961189e+00	4.2659e-02	4.7604e+00	1.3085e+00	9.2626e-01	6.9274e-01
FIM Uncertainties	2.1451e-02	1.9346e-06	8.0366e-02	1.6342e-02	1.1987e-01	1.0935e-01	3.1951e-01
Chain Std. Dev.	8.8852e-03	7.8378e-07	6.4091e-02	1.4080e-02	3.3254e-02	5.9505e-02	7.9266e-02
Mode	1.544e-01	3.012682338824e+00	-6.5273e-02	4.6621e+00	1.2704e+00	2.3126e+00	5.7247e+00
Mean	1.526e-01	3.012681940979e+00	-3.5875e-02	4.6595e+00	1.2638e+00	2.3566e+00	5.7477e+00
FIM Uncertainties	3.6109e-02	1.4600e-06	6.4588e-02	1.0142e-02	3.6485e-01	2.6638e-01	7.4581e-01
Chain Std. Dev.	8.9730e-03	6.3672e-07	5.4611e-02	9.1964e-03	1.8691e-02	4.9275e-02	3.9003e-02
Mode	1.056e-01	3.013138519918e+00	7.5331e-02	4.6800e+00	2.5959e-01	2.4604e+00	3.4543e+00
Mean	1.103e-01	3.013139196308e+00	2.6571e-02	4.6795e+00	3.0592e-01	2.4561e+00	3.3930e+00
FIM Uncertainties	3.4805e-02	1.7128e-06	7.6763e-02	1.2234e-02	3.7136e-01	2.8240e-01	7.7011e-01
Chain Std. Dev.	7.1942e-03	8.5659e-07	5.9487e-02	1.2902e-02	8.2684e-02	5.2598e-02	7.8253e-02
Mode	2.359e-01	3.013647258978e+00	-7.7257e-01	4.0400e+00	4.0566e-01	9.2527e-01	4.6223e+00
Mean	2.404e-01	3.013647415144e+00	-7.7205e-01	4.0394e+00	3.9161e-01	9.2278e-01	4.6447e+00
FIM Uncertainties	3.6984e-02	1.5820e-06	1.3771e-02	1.3134e-02	2.5576e-01	1.9008e-01	5.2229e-01
Chain Std. Dev.	1.4378e-02	5.7317e-07	1.0551e-02	9.5351e-03	3.2015e-02	4.8141e-02	3.6057e-02
Mode	1.565e-01	3.014133944840e+00	-3.0965e-01	4.5620e+00	3.4953e-01	1.4139e+00	5.4478e+00
Mean	1.673e-01	3.014133754544e+00	-2.9576e-01	4.5575e+00	3.1911e-01	1.3592e+00	5.4488e+00
FIM Uncertainties	1.6739e-02	2.9721e-06	6.7050e-02	1.8129e-02	5.0381e-02	5.0080e-02	3.1162e-01
Chain Std. Dev.	1.6236e-02	8.3058e-07	4.6172e-02	1.6931e-02	4.1007e-02	4.7949e-02	3.7935e-02
Mode	2.090e-01	3.014573853512e+00	-1.5720e-02	4.7093e+00	1.4653e+00	2.4211e+00	3.0857e+00
Mean	2.197e-01	3.014573954343e+00	-2.7401e-02	4.7083e+00	1.4418e+00	2.4007e+00	3.0233e+00
FIM Uncertainties	3.1349e-02	9.3257e-07	4.6379e-02	6.7644e-03	1.0353e-01	8.8588e-02	2.2039e-01
Chain Std. Dev.	1.3660e-02	6.0665e-07	2.7662e-02	6.3868e-03	5.1536e-02	6.4275e-02	7.3056e-02
Mode	2.709e-01	3.014671843899e+00	-4.7054e-01	4.3779e+00	8.9024e-02	6.3409e-01	3.7596e+00
Mean	2.711e-01	3.014671120097e+00	-4.6997e-01	4.3767e+00	1.3058e-01	6.3934e-01	3.7434e+00
FIM Uncertainties	8.9168e-02	1.1463e-06	1.6174e-02	7.6376e-03	5.8509e-01	4.5399e-01	1.1877e+00
Chain Std. Dev.	1.0865e-02	8.3443e-07	1.3847e-02	6.7427e-03	4.9996e-02	4.4792e-02	3.5152e-02
Mode	4.678e-01	3.014793856950e+00	-2.7417e-01	4.4881e+00	5.6110e-01	9.9509e-01	5.3635e+00
Mean	4.750e-01	3.014794114073e+00	-2.6944e-01	4.4896e+00	5.5320e-01	1.0027e+00	5.3746e+00
FIM Uncertainties	2.7246e-02	8.4269e-07	2.1821e-02	6.7541e-03	3.8256e-02	3.5127e-02	1.2311e-01
Chain Std. Dev.	2.3236e-02	5.7536e-07	1.7189e-02	5.9658e-03	2.7361e-02	4.0192e-02	3.6000e-02
Mode	1.987e-01	3.014895678982e+00	5.2280e-02	4.6762e+00	5.1839e-01	1.4864e+00	4.0499e+00
Mean	1.957e-01	3.014895905244e+00	1.9029e-02	4.6714e+00	5.0862e-01	1.4430e+00	4.0531e+00
FIM Uncertainties	2.2347e-02	2.0071e-06	1.5016e-01	2.5888e-02	4.7811e-02	4.6029e-02	2.6049e-01
Chain Std. Dev.	1.6337e-02	8.2535e-07	7.8312e-02	2.2821e-02	2.1981e-02	4.7063e-02	5.1157e-02

TABLE XVII: Results of a search of the MLDC Challenge Data Set 1.1.5. Note: Multi-modal behavior of the chains have not been explicitly marked due to time constraints.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Mode	2.714e-01	3.001014784390e+00	-3.6437e-01	4.4908e+00	1.3228e+00	1.3045e+00	8.0599e-01
Mean	2.742e-01	3.001014517155e+00	-3.5312e-01	4.4914e+00	1.3289e+00	1.3083e+00	1.1054e+00
FIM Uncertainties	2.2323e-02	2.3503e-06	4.9617e-02	1.5033e-02	4.9489e-02	4.5030e-02	2.7729e-01
Chain Std. Dev.	2.2221e-02	2.6158e-06	6.4733e-02	1.4641e-02	4.6181e-02	4.5096e-02	2.5116e-01
Mode	1.917e-01	3.001068147720e+00	-3.5084e-02	4.6294e+00	2.6868e+00	1.3933e+00	2.0372e+00
Mean	1.993e-01	3.001066516273e+00	-4.7920e-02	4.6297e+00	2.7011e+00	1.3371e+00	2.1686e+00
FIM Uncertainties	3.1165e-02	2.3579e-06	1.3431e-01	2.0992e-02	9.5027e-02	8.2405e-02	3.3947e-01
Chain Std. Dev.	2.0545e-02	2.2049e-06	7.8783e-02	1.7894e-02	6.8740e-02	8.7589e-02	3.0358e-01
Mode	7.152e-01	3.001105702723e+00	2.6436e-01	4.8998e+00	1.4594e+00	1.2659e+00	8.8856e-01
Mean	7.181e-01	3.001106295024e+00	2.5330e-01	4.9005e+00	1.4571e+00	1.2772e+00	8.4768e-01
FIM Uncertainties	3.6050e-02	9.9313e-07	2.5977e-02	5.9385e-03	3.0371e-02	3.1267e-02	1.2180e-01
Chain Std. Dev.	2.9663e-02	8.3690e-07	2.1126e-02	5.0426e-03	2.3180e-02	2.5652e-02	8.0018e-02
Mode	2.349e-01	3.001258207957e+00	-5.2030e-01	4.3919e+00	1.6359e+00	8.1923e-01	1.6204e+00
Mean	2.415e-01	3.001257953287e+00	-5.2003e-01	4.3900e+00	1.6328e+00	7.8506e-01	1.6982e+00
FIM Uncertainties	5.6911e-02	1.2524e-06	1.7074e-02	8.9862e-03	3.5173e-01	2.5793e-01	7.2955e-01
Chain Std. Dev.	2.0535e-02	1.2609e-06	1.7694e-02	8.9561e-03	1.0890e-01	1.1116e-01	1.7940e-01
Mode	1.733e-01	3.001297792738e+00	1.0066e+00	5.9046e+00	1.8039e+00	2.1503e+00	3.2843e+00
Mean	1.668e-01	3.001296910114e+00	1.0047e+00	5.8912e+00	1.8194e+00	2.0667e+00	2.8368e+00
FIM Uncertainties	3.6581e-02	3.5971e-06	2.2113e-02	4.3035e-02	2.1243e-01	1.8376e-01	5.5102e-01
Chain Std. Dev.	1.6765e-02	3.5005e-06	2.2580e-02	3.9889e-02	1.2899e-01	1.0225e-01	3.7583e-01
Mode	4.523e-01	3.001446186975e+00	-6.3996e-02	4.6565e+00	2.9926e+00	1.9754e+00	1.4422e+00
Mean	4.496e-01	3.001446065757e+00	-4.7061e-02	4.6559e+00	2.9875e+00	1.9806e+00	1.4542e+00
FIM Uncertainties	2.2058e-02	6.0776e-07	3.0231e-02	5.4889e-03	3.2159e-02	2.9346e-02	8.8295e-02
Chain Std. Dev.	2.2789e-02	5.5760e-07	2.7483e-02	5.3602e-03	4.3080e-02	3.3144e-02	1.0417e-01
Mode	4.310e-01	3.000766687312e+00	1.9186e-01	4.7546e+00	2.9187e+00	1.5092e+00	2.5869e+00
Mean	4.332e-01	3.000766196651e+00	1.8618e-01	4.7541e+00	2.9231e+00	1.5092e+00	2.6335e+00
FIM Uncertainties	1.7339e-02	1.1277e-06	4.0668e-02	8.1763e-03	1.9821e-02	1.9513e-02	1.1217e-01
Chain Std. Dev.	1.7753e-02	1.3729e-06	3.9327e-02	8.4143e-03	2.0390e-02	1.9414e-02	1.3268e-01
Mode	3.425e-01	3.000022640856e+00	-2.8038e-01	4.6022e+00	2.5135e-02	7.8747e-01	2.2421e+00
Mean	3.598e-01	3.000022921412e+00	-2.8602e-01	4.6042e+00	1.5707e+00	7.3962e-01	2.4644e+00
FIM Uncertainties	9.8584e-02	1.2017e-06	2.4988e-02	6.5509e-03	4.1234e-01	3.4061e-01	8.3773e-01
Chain Std. Dev.	3.4886e-02	1.0669e-06	2.8449e-02	6.5354e-03	1.4578e+00	1.3015e-01	2.5138e-01
Mode	2.169e-01	3.000049535940e+00	9.2088e-02	4.6768e+00	7.5956e-01	1.7744e+00	1.6113e+00
Mean	2.177e-01	3.000049929497e+00	4.6367e-02	4.6745e+00	7.1163e-01	1.7977e+00	1.6184e+00
FIM Uncertainties	6.1513e-02	3.2738e-06	1.3773e-01	2.4602e-02	1.5826e-01	2.8159e-01	4.1521e-01
Chain Std. Dev.	2.6015e-02	1.7606e-06	8.9738e-02	1.4799e-02	1.0355e-01	1.0727e-01	1.8252e-01
Mode	3.440e-01	3.000085166440e+00	-1.6630e-01	4.5263e+00	3.2964e-01	1.5354e+00	2.8803e+00
Mean	3.319e-01	3.000086782756e+00	-1.7888e-01	4.5177e+00	3.3856e-01	1.5397e+00	2.6676e+00
FIM Uncertainties	3.8673e-02	3.1729e-06	8.1218e-02	1.6516e-02	3.8990e-02	5.5377e-02	2.8566e-01
Chain Std. Dev.	2.6215e-02	3.2176e-06	9.2476e-02	2.0219e-02	3.8955e-02	4.1770e-02	3.2948e-01
Mode	3.635e-01	3.000253789523e+00	1.6355e-01	4.6061e+00	5.5138e-01	1.5925e+00	1.1693e+00
Mean	3.622e-01	3.000254297201e+00	1.7246e-01	4.6043e+00	5.5613e-01	1.5969e+00	1.0742e+00
FIM Uncertainties	1.7348e-02	1.2202e-06	4.2625e-02	8.4043e-03	2.3682e-02	2.4862e-02	1.2420e-01
Chain Std. Dev.	1.7850e-02	2.2771e-06	7.4173e-02	9.7589e-03	2.8861e-02	3.1506e-02	2.0627e-01

TABLE XVIII: Results of a search of the MLDC Challenge Data Set 1.1.5, continued.

	A (10^{-22})	f (mHz)	θ	ϕ	ψ	ι	φ_0
Mode	7.548e-01	3.000357289876e+00	-8.0995e-02	4.6334e+00	4.2485e-01	1.3858e+00	2.8660e+00
Mean	7.572e-01	3.000357396888e+00	-7.9648e-02	4.6327e+00	4.2901e-01	1.3817e+00	2.8924e+00
FIM Uncertainties	1.9617e-02	4.3469e-07	2.0732e-02	3.9152e-03	1.4430e-02	1.4426e-02	5.1995e-02
Chain Std. Dev.	1.8249e-02	4.1148e-07	1.7394e-02	4.2684e-03	1.3649e-02	1.3551e-02	4.9863e-02
Mode	1.226e-01	3.000487250790e+00	-1.1989e+00	8.3832e-01	1.9500e+00	3.5677e+00	2.0765e+00
Mean	1.252e-01	3.000487418218e+00	-1.1880e+00	8.2528e-01	1.8780e+00	3.0326e+00	2.1208e+00
FIM Uncertainties	2.8973e-01	1.6881e-06	1.7317e-02	3.8140e-02	2.0822e+01	7.1728e+00	4.1658e+01
Chain Std. Dev.	1.5815e-02	2.1811e-06	2.2848e-02	5.6497e-02	1.6169e-01	5.6209e-01	2.3845e-01
Mode	4.505e-01	2.999510059616e+00	-8.9371e-02	4.5503e+00	2.2647e+00	1.1568e+00	2.6460e+00
Mean	4.576e-01	2.999510159865e+00	-9.7434e-02	4.5501e+00	2.2741e+00	1.1535e+00	2.6162e+00
FIM Uncertainties	3.2493e-02	1.0390e-06	3.7349e-02	7.3795e-03	4.9796e-02	4.9915e-02	1.5327e-01
Chain Std. Dev.	2.6070e-02	8.1423e-07	3.5216e-02	6.5002e-03	4.1902e-02	3.8610e-02	1.2614e-01
Mode	5.736e-01	2.999547934972e+00	-2.9091e-01	4.6252e+00	2.2939e+00	1.7333e+00	8.4328e-01
Mean	5.817e-01	2.999547353300e+00	-2.8004e-01	4.6259e+00	2.2928e+00	1.7323e+00	7.6416e-01
FIM Uncertainties	2.1357e-02	1.7725e-06	4.7183e-02	8.4294e-03	2.1348e-02	2.0825e-02	1.9052e-01
Chain Std. Dev.	2.4039e-02	1.2696e-06	3.0203e-02	6.8656e-03	2.0334e-02	2.3471e-02	1.3906e-01
Mode	4.430e-01	2.999844128893e+00	4.9318e-02	4.6914e+00	1.7634e+00	2.2503e+00	5.2261e-01
Mean	4.315e-01	2.999844039525e+00	5.1226e-02	4.6922e+00	1.7620e+00	2.2968e+00	6.2409e-01
FIM Uncertainties	3.7478e-02	3.6316e-07	1.8774e-02	3.6424e-03	1.3455e-01	9.8512e-02	2.7239e-01
Chain Std. Dev.	3.7270e-02	3.6294e-07	1.9785e-02	3.7037e-03	7.4755e-02	1.0679e-01	1.5132e-01
Mode	2.782e-01	2.999003571858e+00	-2.1613e-01	4.7240e+00	2.0139e+00	1.4935e+00	3.3139e+00
Mean	2.789e-01	2.999004244124e+00	-2.2923e-01	4.7234e+00	2.0121e+00	1.4926e+00	2.9969e+00
FIM Uncertainties	2.0475e-02	2.1529e-06	6.0607e-02	1.4915e-02	3.8123e-02	3.7760e-02	2.4551e-01
Chain Std. Dev.	1.9239e-02	2.4575e-06	5.6584e-02	1.4069e-02	4.1419e-02	3.4393e-02	2.7612e-01
Mode	1.451e+00	2.999098725925e+00	-1.4034e-02	4.8820e+00	4.0555e-02	1.5430e+00	2.2097e+00
Mean	1.460e+00	2.999098711112e+00	-1.0095e-02	4.8820e+00	4.0989e-02	1.5431e+00	2.2286e+00
FIM Uncertainties	4.2939e-02	7.3404e-07	2.8012e-02	4.0236e-03	9.8803e-03	9.6551e-03	5.0688e-02
Chain Std. Dev.	2.7403e-02	4.1910e-07	1.8085e-02	3.2505e-03	7.4093e-03	8.1026e-03	3.5312e-02
Mode	1.195e-01	2.999148647928e+00	-7.8061e-02	4.5896e+00	2.4504e+00	1.8886e+00	5.9564e+00
Mean	1.245e-01	2.999149826183e+00	-6.2585e-02	4.5990e+00	2.4269e+00	1.9540e+00	5.8459e+00
FIM Uncertainties	9.0044e-02	7.3343e-06	2.2615e-01	4.0612e-02	8.5996e-01	7.0107e-01	1.8813e+00
Chain Std. Dev.	1.6133e-02	3.9782e-06	8.3248e-02	1.7822e-02	4.6622e-01	1.6838e-01	7.2669e-01
Mode	1.563e-01	2.999166896883e+00	-9.6491e-02	4.7435e+00	2.0553e+00	1.8421e+00	2.4879e+00
Mean	1.651e-01	2.999167523973e+00	-1.3225e-01	4.7425e+00	2.0029e+00	1.8641e+00	2.6036e+00
FIM Uncertainties	5.9079e-02	8.7303e-06	2.5961e-01	6.3970e-02	2.2817e-01	2.5938e-01	1.0656e+00
Chain Std. Dev.	2.8307e-02	2.2320e-06	8.7739e-02	1.9619e-02	9.9864e-02	8.1185e-02	1.8788e-01
Mode	4.183e-01	2.999324054800e+00	-9.6773e-02	4.6400e+00	2.4949e+00	1.5805e+00	3.0910e+00
Mean	4.143e-01	2.999324597181e+00	-7.9786e-02	4.6390e+00	2.4995e+00	1.5840e+00	3.0628e+00
FIM Uncertainties	1.7322e-02	7.2377e-07	5.3945e-02	8.0467e-03	2.1131e-02	2.2041e-02	8.0127e-02
Chain Std. Dev.	1.6462e-02	1.1252e-06	5.2542e-02	8.2864e-03	2.0279e-02	2.0972e-02	1.2679e-01
Mode	1.741e-01	2.998523483928e+00	-1.8932e-01	4.6343e+00	2.6723e+00	9.4913e-01	1.7377e+00
Mean	1.807e-01	2.998523494592e+00	-1.8969e-01	4.6320e+00	2.6402e+00	8.8192e-01	1.7614e+00
FIM Uncertainties	4.3324e-02	1.6631e-06	5.1192e-02	1.2496e-02	2.8597e-01	2.2137e-01	6.0625e-01
Chain Std. Dev.	2.2195e-02	1.2594e-06	3.7454e-02	1.1216e-02	8.8802e-02	1.0700e-01	1.8488e-01

TABLE XIX: Results of a search of the MLDC Challenge Data Set 1.1.5, continued.

Mode	6.076e-02	2.998577512648e+00	-2.1816e-01	4.6873e+00	3.0316e+00	4.0298e-01	1.1573e+00
Mean	7.055e-02	2.998576283046e+00	-1.9626e-01	4.6810e+00	1.4954e+00	7.1487e-01	9.9772e-01
FIM Uncertainties	1.7704e-01	4.3741e-06	1.7995e-01	3.5404e-02	1.9621e+01	8.2123e+00	3.9293e+01
Chain Std. Dev.	1.4232e-02	2.5482e-06	1.1758e-01	2.7671e-02	1.4366e+00	2.6840e-01	3.5399e-01
Mode	9.986e-02	2.998738009916e+00	-7.2723e-01	5.5311e+00	1.0683e+00	1.0009e+00	7.5417e-02
Mean	1.002e-01	2.998736901502e+00	-7.1156e-01	5.5218e+00	1.0456e+00	1.1099e+00	1.8789e+00
FIM Uncertainties	3.2334e-02	3.9835e-06	6.8871e-02	4.5317e-02	2.3138e-01	2.0797e-01	5.6987e-01
Chain Std. Dev.	2.2396e-02	3.5653e-06	6.7863e-02	4.2473e-02	1.8506e-01	1.5480e-01	2.6928e+00
Mode	1.291e-01	2.998744375836e+00	-3.6966e-01	4.4817e+00	2.4601e+00	5.4717e-01	3.1747e+00
Mean	1.349e-01	2.998744072695e+00	-3.6725e-01	4.4809e+00	2.4727e+00	5.9868e-01	3.1369e+00
FIM Uncertainties	4.3880e-01	2.2793e-06	3.9156e-02	1.6559e-02	5.7413e+01	1.5477e+01	1.1481e+02
Chain Std. Dev.	2.0817e-02	1.7781e-06	3.5688e-02	1.4458e-02	1.6288e-01	2.1924e-01	2.6215e-01
Mode	5.136e-01	2.998787553900e+00	1.7910e-01	4.7926e+00	1.9968e+00	1.5964e+00	2.8619e+00
Mean	5.151e-01	2.998786827052e+00	1.7566e-01	4.7936e+00	1.9959e+00	1.6001e+00	2.9667e+00
FIM Uncertainties	2.1101e-02	1.2193e-06	3.1773e-02	6.7623e-03	1.9393e-02	2.0556e-02	1.2787e-01
Chain Std. Dev.	2.1461e-02	1.0934e-06	3.1512e-02	6.4974e-03	1.7842e-02	2.0948e-02	1.1846e-01
Mode	1.606e-02	2.998875393880e+00	1.0759e+00	1.8101e+00	2.1993e-02	2.1917e+00	2.5966e+00
Mean	5.415e-02	2.998887620628e+00	1.1134e+00	1.7446e+00	1.8551e+00	1.9425e+00	3.0114e+00
FIM Uncertainties	5.0992e-02	4.8780e-06	6.1759e-02	6.7329e-02	7.1603e-01	5.5535e-01	1.5228e+00
Chain Std. Dev.	4.0957e-02	1.9038e-05	1.3917e-01	1.5482e-01	1.1450e+00	2.6992e-01	4.1833e-01