Resolving Galaxy Formation & Evolution with the Large UV Optical Infrared Telescope

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1. Order of magnitude improvement in **resolution**

2. Vastly improved **sensitivity** and instrumentation

3. Broad **wavelength coverage**, extending UV to NIR
Spatially resolve *everything in the Universe* at <100 pc scales!

- HST (2.4m, 0.5 µm)
- JWST (6.5m, 2 µm)
- LUVOIR-A (15m, 0.5 µm)
Star-forming Galaxy at $z=2.5$

F390W (110 nm @ $z=2.5$)

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Source-plane Reconstruction

F390W (110 nm @ $z=2.5$)

Star-forming Galaxy at $z=2.5$

- Probing star formation on ~50-100 pc scales!
- Spatially resolve SFR, emission-line diagnostics, age, metallicity and dust properties to reconstruct the “story” of how (lensed) galaxies assembled.

Star-forming Galaxy at $z=2.5$

LUVOIR takes us from a few to MILLIONS of distant galaxies!

Star-forming Galaxy at $z=2.5$

<table>
<thead>
<tr>
<th>Radius [kpc]</th>
<th>Stellar Density [$M_\odot/kpc^3$]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>$10^4$</td>
</tr>
<tr>
<td>1</td>
<td>$10^6$</td>
</tr>
<tr>
<td>10</td>
<td>$10^8$</td>
</tr>
<tr>
<td>100</td>
<td>$10^{10}$</td>
</tr>
</tbody>
</table>


Ultra-Compact Galaxy

Milky Way

$z\approx 2.3$

$z\approx 0$
Compact Galaxies at $z \sim 2$ are barely resolved by Hubble.

Resolution of 4-6 meter class space telescopes NOT enough!
- **Compact Galaxies at z~2 are barely resolved by Hubble.**

- **Resolution of 4-6 meter class space telescopes NOT enough!**
How do galaxies quench?

1. High Angular Resolution
2. Wide Field of View
3. UV/Optical Imaging+Spectroscopy

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1. High Angular Resolution
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Key observational signatures will be captured in **spatially-resolved** age, dust, SFR, and metallicity.

**Image Credit:** (Top) Pearson Education, (Middle) Zolotov et al. 2014, (Bottom) NASA/ESA/Hubble Heritage Team, (Left) NASA/ESA/S.Toft/A.Feild
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