Chapter/ Question	Objectives	Measurements	Observations	LUVOIR-A	Undescoped LUVOIR-B	Quick Descoped LUVOIR-B
Chapter 3 Is there life elsewhere?	Frequency of habitable exoplanet candidates	Survey for dozens of rocky planets around F,G,K,M stars	Multi-band high-contrast photometry near 500 nm (SNR=5 in ≥10% bands)	~50	~30	≲ 19
		Establish habitable zone orbits of rocky planets	Multi-epoch (6 visits) high-contrast photometry near 500 nm (SNR=5 in ≥10% bands)	✓	✓	✓
		Search for water vapor in habitable zone rocky planet atmospheres	High-contrast spectroscopy near 900 nm (SNR=5, R≥70)	✓	✓	✓
	Characterize exoplanet host stars	Measure UV spectrum and activity of host stars	UV spectroscopy (SNR=50, R > 10,000 at Lyman alpha; SNR=10, R >100 in NUV); time-resolved	✓	✓	
	Confirmation of habitable exoplanet conditions	Constrain abundances of major atmospheric constituents (e.g. H_2O, CO_2, CH_4)	High-contrast spectroscopy between 500 nm and 2.0 μm (SNR=10, R≥70)	✓	✓	
		Detect surface liquid water and constrain atmospheric water vapor profile	High-contrast spectroscopy and photometry between 1.0 μm - 1.5 μm at phase angles > 100° at inner-working angles ≤ 3 λ/D (SNR>10, R≥70)	✓	✓	
		Determine atmospheric properties (Rayleigh scattering, haze)	Multi-band high-contrast photometry between 200 nm - 500 nm (SNR=5 in >10% bands)	✓	✓	
	Search for signs of life on exoplanets	Constrain abundances of atmospheric biosignature gases (e.g. O_2, O_3, CH_4), and false positive indicators (e.g. high-CO_2, O_4)	High-contrast spectroscopy at 760 nm for O_2 (SNR>10, R=140)	✓	✓	
			High-contrast photometry between 200 nm - 700 nm for O_3 (SNR>5 in ≥10% bands)	✓	✓	
			High-constrast spectroscopy between 1.0 μm - 1.8 μm for CH_4, CO_2, O_4 (SNR>10, R=70, 200)	✓	✓	
	Investigate habitability of Solar System ocean moons	Observe changes in surface morphology	Multi-epoch imaging between 500 nm - 2.0 μm (SNR≥5)	✓	✓	
		Monitor plume activity and study plume morphology and dynamics	Multi-epoch, spatially resolved spectroscopy at Lyman-alpha (SNR>5, R=30,000)	✓	~	
		Determine moon atmospheric properties	Multi-epoch, spatially resolved spectroscopy from 1.0 μm - 2.0 μm (SNR>10, R=70, 200)	✓	✓	
Chapter 4 How do we fit in?	Constrain exoplanet atmospheric composition	Constrain abundances of gases (e.g. H_2O, CO_2, CH_4, O_2)	High-contrast spectroscopy between 500 nm - 2.0 μm (SNR>10, R=70-200)	✓	✓	
	Detect and characterize atmospheric hazes and clouds	Constrain haze and cloud abundances	High-contrast photometry bewteen 200 nm - 1 μm (SNR>5 in ≥10% bands)	✓	✓	
	Determine planetary system architectures	Determine planet mass and orbital paramteters	Multi-epoch astrometric imaging (~0.1 μas precision)	✓	?	
		Constrain atmospheric composition	High-contrast spectroscopy between 500 nm - 2.0 μm (SNR>10, R=70-200)	✓	✓	
	Determine morphology and architecture of debris disks	Spatially map dust distribution	High-contrast imaging bewteen 500 nm - 1.0 μm	✓	✓	
	Determine bulk composition of extrasolar planetesimals	Measure abundances of multiple atomic and molecular species in debris disk gas	High resolution spectroscopy from 1000 Å - 4000 Å (SNR≥10, R≥60,000)	✓	~	
	Characterize full population of solar system minor bodies	Measure size, distribution, orbital parameters	Multi-epoch imaging between 500 nm - 2.5 μm	✓	✓	
		Measure size, distribution, orbital parameters	Spatially resolved spectroscopy between 1.0 μm - 2.0 μm (R=70,200) and between 1000 Å - 2000 Å (R=30,000)	✓	✓	
	Constrain the physics of atmospheric escape	Detect, map, and characterize outflows	Multi-object spectroscopy from 1000 Å - 4000 Å (SNR>20, R=30,000)	✓	✓	
Chapter 5 How do galaxies evolve?	Measuring the baryons over cosmic time from 10-10^7 K	Absorption line measures: Column density, velocity width, redshift for multiple ions	Multi-object spectroscopy from 1000 Å - 4000 Å (SNR>20, R=30,000)	✓	✓	
	High-definition exploration of the CGM	Absorption line measures: Column density, velocity width, redshift for multiple ions	Multi-object spectroscopy from 1000 Å - 3000 Å (SNR≥10, R=30,000)	✓	✓	
		Emission line maps of multiple ions	Multi-object spectroscopy and imaging from 1000 Å - 3000 Å (SNR≥5, R=30,000)	✓	X	
	Characterize nearby galaxy inflows and outflows in detail	Spatially map inflowing/outflowing gas in absorption	Multi-object spectroscopy between 1000 Å - 4000 Å (SNR≥30, R=30,000)	✓	✓	
	Explore star formation histories across the Hubble sequence	Color-Magnitude diagrams for stars in galaxies out to tens of Mpc across multiple galaxy types	g- and r-band imaging (SNR>5)	✓	~	
Chapter 6 What are the building block	Determine the turnover in the high redshift galaxy luminosity function	Incidence frequency of z~7 galaxies at faint magnitudes	I-, J-, and H-band imaging (SNR>=5 to J>33.5)	✓	X	
	Constrain the nature of dark matter	Matter power spectrum on small scales via observations of dwarf galaxies near Milky Way analogues	V- and R-band imaging (SNR>5 to V>31)	✓	X	
		Stellar proper motions in Local Group galaxies	Multi-epoch astrometric imaging (~0.5 μas precision)	✓	~	
	Determine the escape fraction of ionizing radiation out to z~1	Amount of flux below the Lyman break for N>5000 galaxies from 0.2 < z < 1.2	Multi-object spectroscopy between 1000 Å - 2000 Å (SNR≥5, R≤500)	✓	✓	
Chapter 7 How do stars and planets	Constrain massive star formation and determine the stellar IMF	Imaging of individual stars and star clusters	U-, B-, V-, R-, I-band imaging (SNR 10-300)	✓	~	
		Spectroscopy of individual stars and star clusters	Multi-object spectroscopy from 1000 Å - 4000 Å (SNR>10, R=30,000)	✓	~	
	Characterize the composition of planet forming material	Spectroscopy of atoms and molecules in protoplanetary disks	Multi-object spectroscopy from 1000 Å - 4000 Å (SNR>10, R=30,000)	✓	✓	
	Follow the rise of the periodic table	Spectroscopy of extremely metal-poor stars in the Milky Way halo	Multi-object spectroscopy from 1000 Å - 4000 Å (SNR≥80, R=30,000)	✓	✓	
		Spectroscopy of late-type stars in the Milky Way halo	Multi-object spectroscopy from 1000 Å - 4000 Å (SNR≥80, R=30,000)	✓	✓	