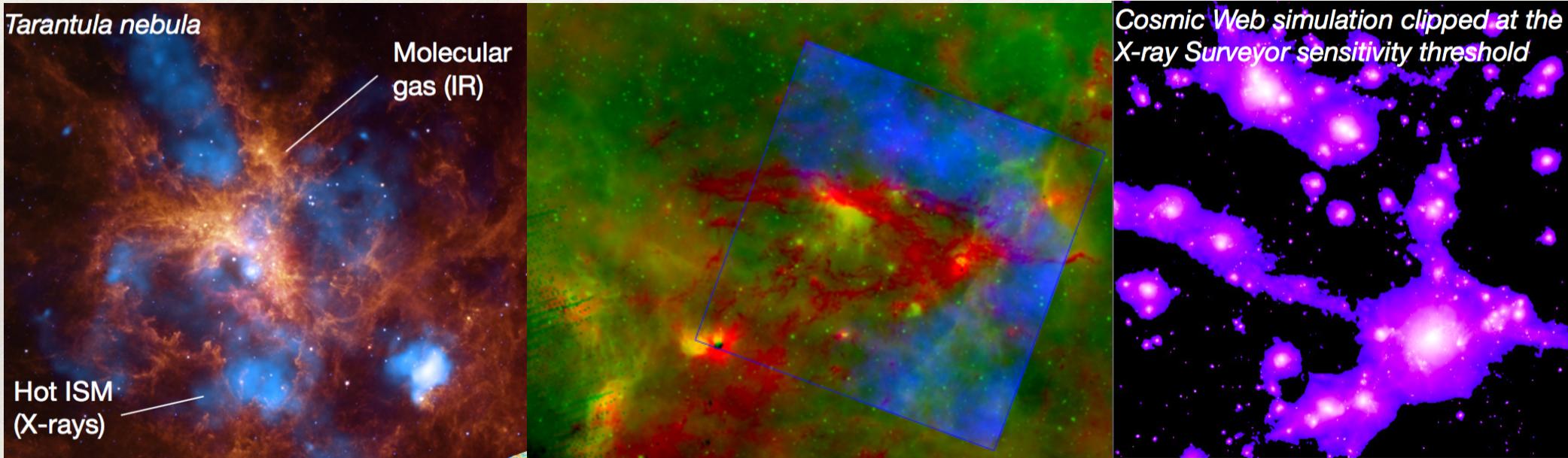


Lynx Mission Concept

HEAD 2017 PCOS Town Hall



Feryal Ozel
on behalf of the Science and Technology Definition Team
August 22, 2017



Lynx Team Activities

- ❖ A very active membership comprising 8 Science WGs, Optics WG, Instrument WG
- ❖ Weekly telecons, face-to-face meetings, virtual day-long meetings, industry days
- ❖ Active & large community participation



Key decisions and work topics for the *Lynx* STDT

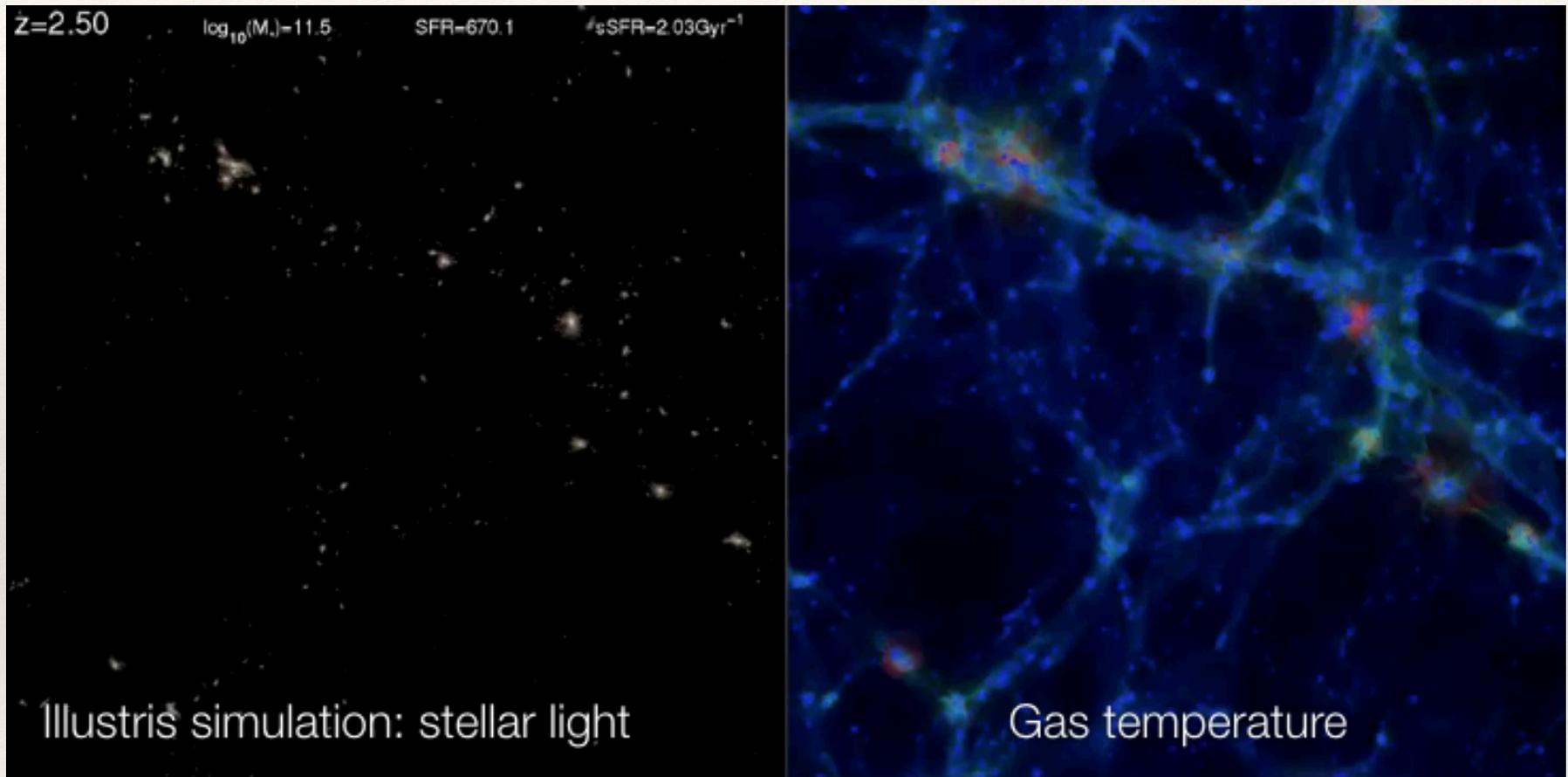
- ✓ What kind of observatory *Lynx* should be?
- ✓ How big?
- ✓ Detailed requirements on the optics
- ✓ Science instrument suite, and requirements
 - Complete mission design
 - Progress in technology, develop technology roadmap
 - Write up the science case

Compelling Science Pillars

- ❖ The Invisible Drivers of Galaxy Formation and Evolution
- ❖ The Dawn of Black Holes

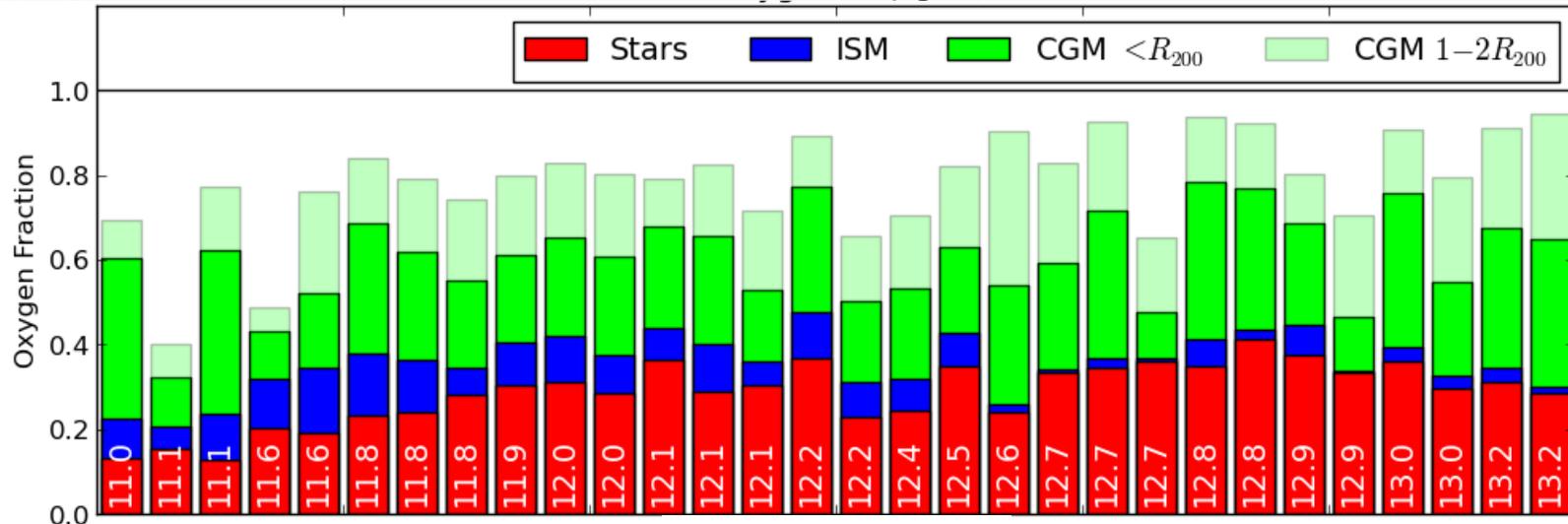


The Invisible Drivers of Galaxy Formation and Evolution

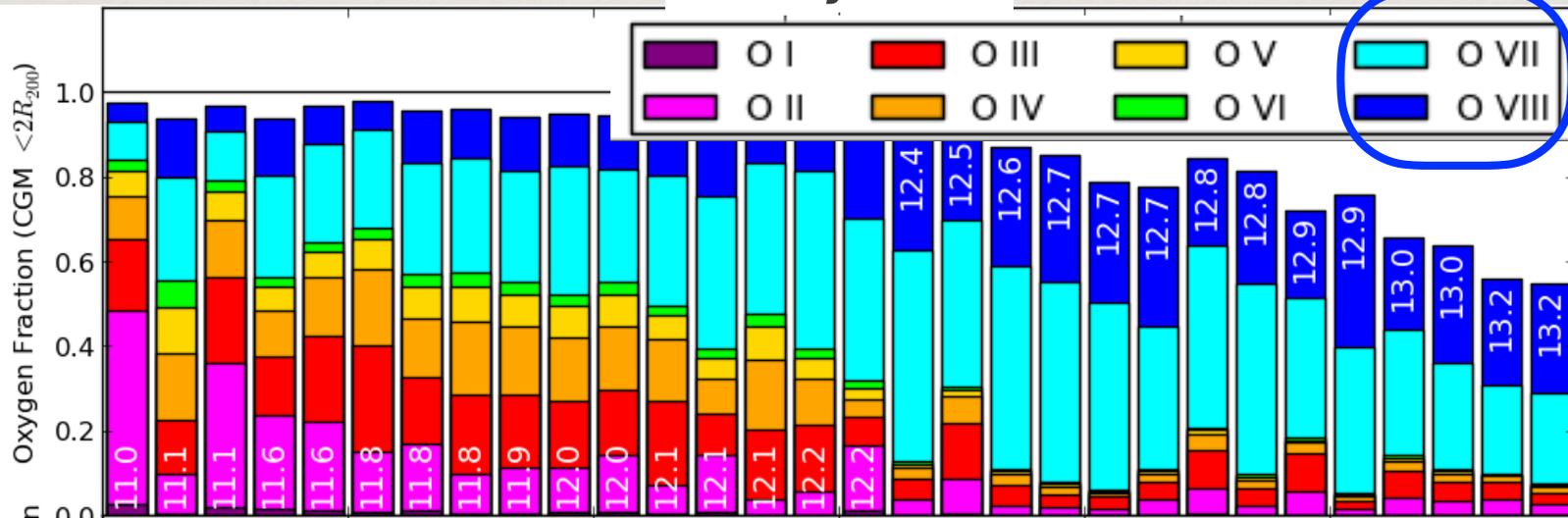


Incisive Diagnostics of CGM/IGM

Oppenheimer et al '16: EAGLE simulation: Oxygen census and Ionization Fractions



Galaxy Mass \rightarrow



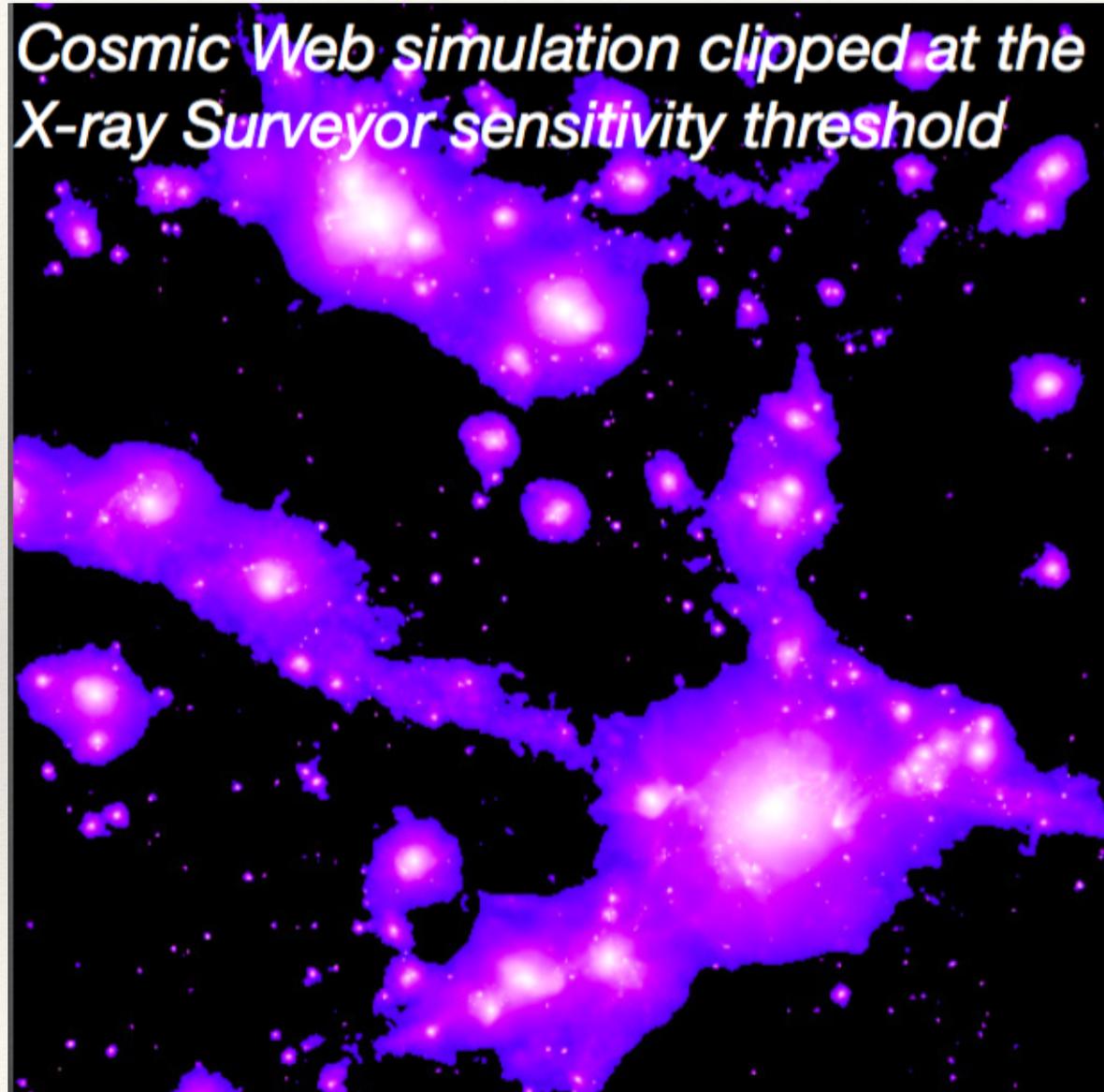
L^* galaxies: $>50\%$ of O is in CGM

L^*

$\sim 80\%$ of that is observed in X-ray transitions (OVII at 0.57 keV, OVIII at 0.65 keV)

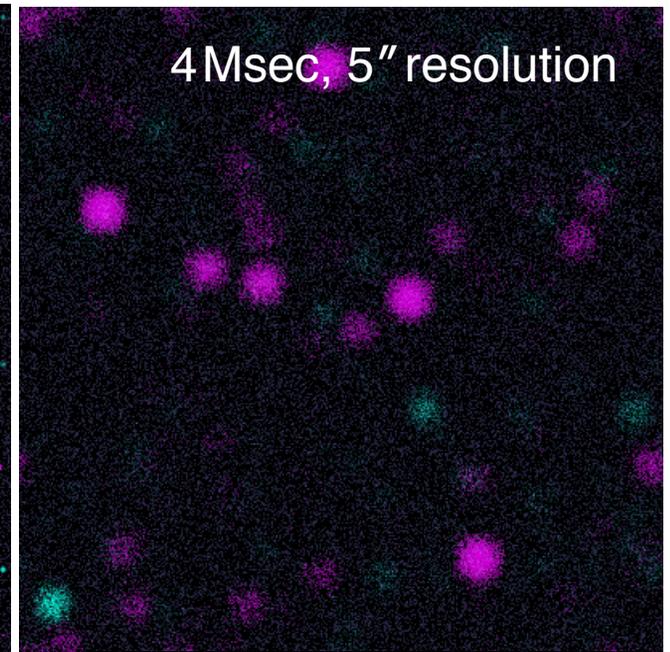
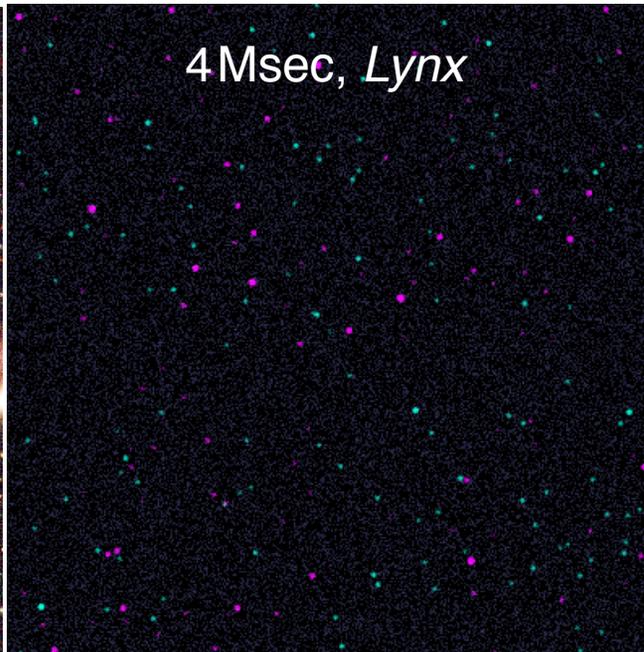
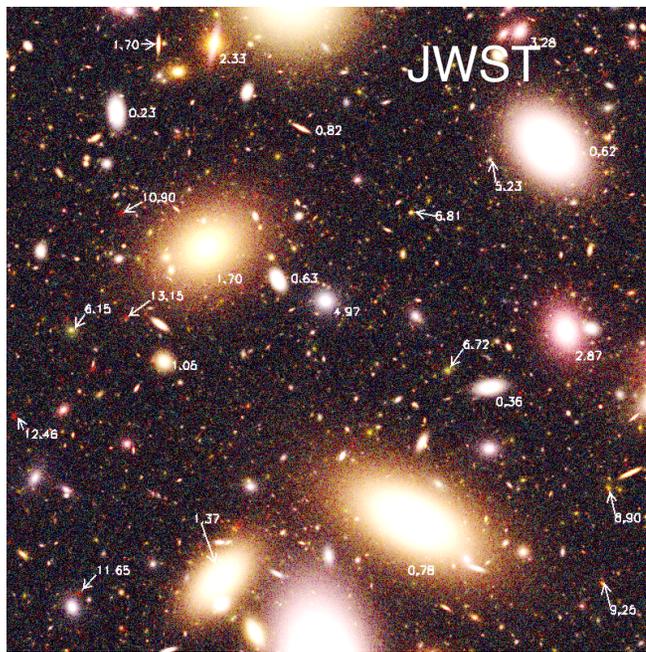


Mapping out the IGM

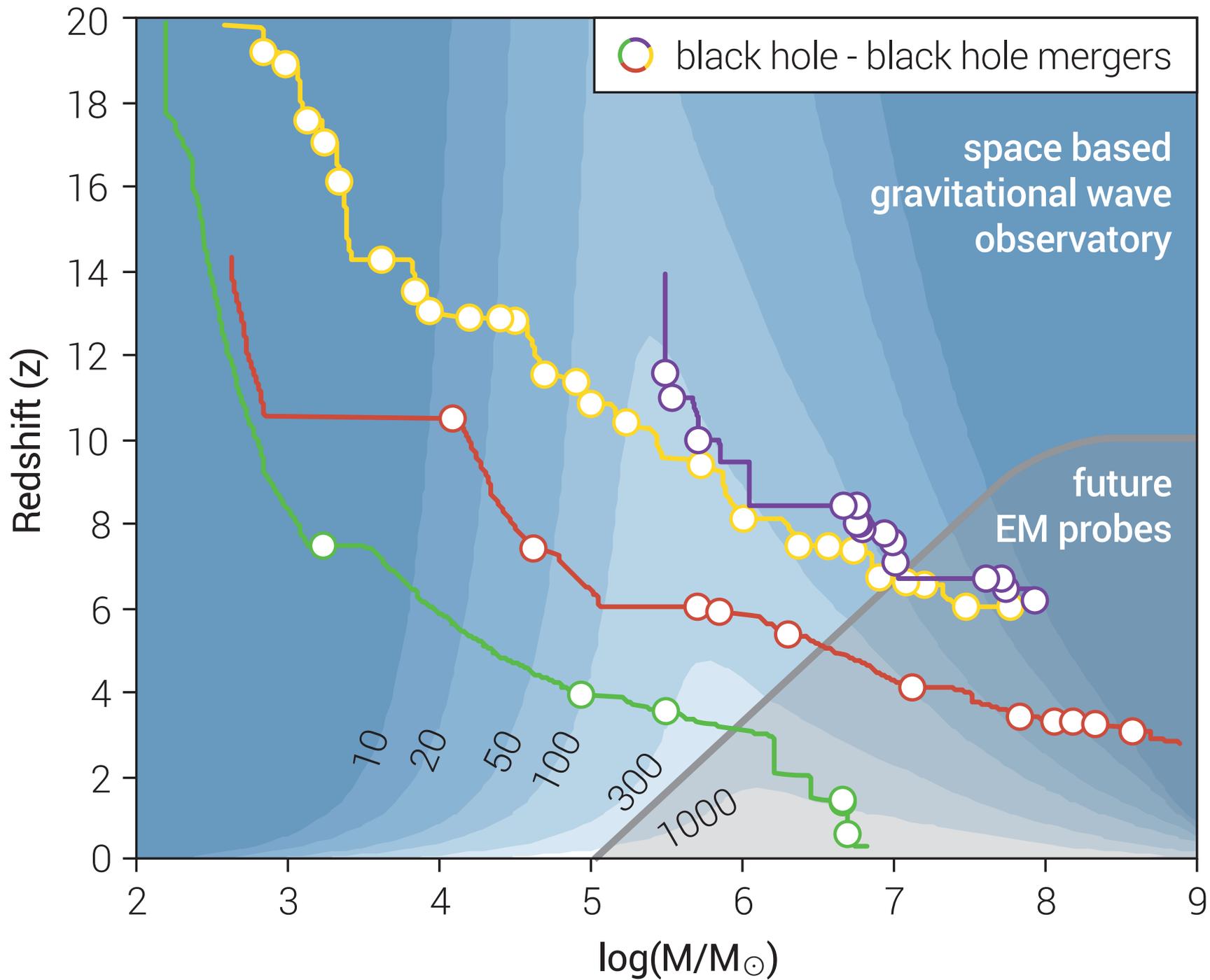


The Dawn of Black Holes

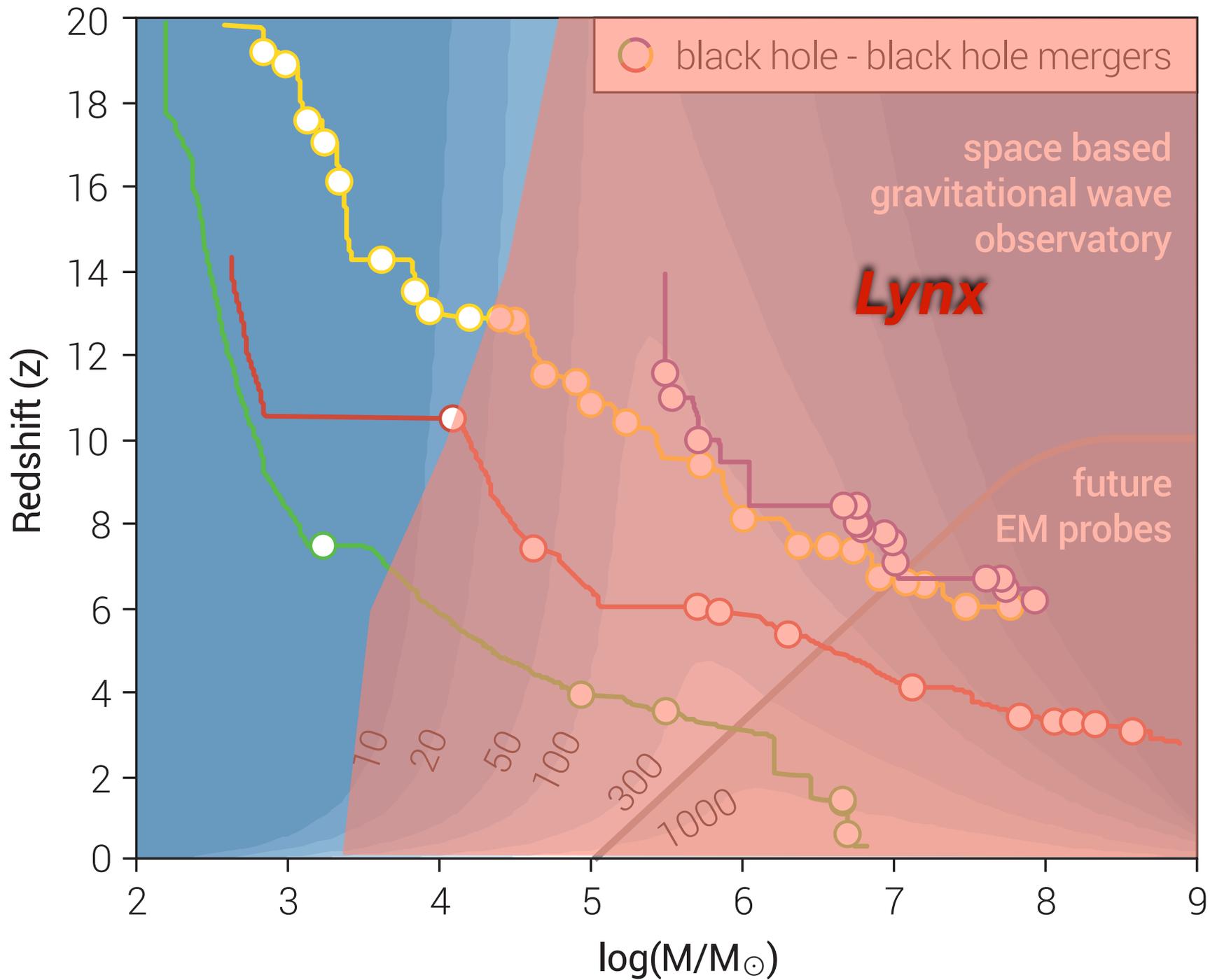
Simulated 2x2 arcmin deep fields observed with JWST, Lynx, and ATHENA



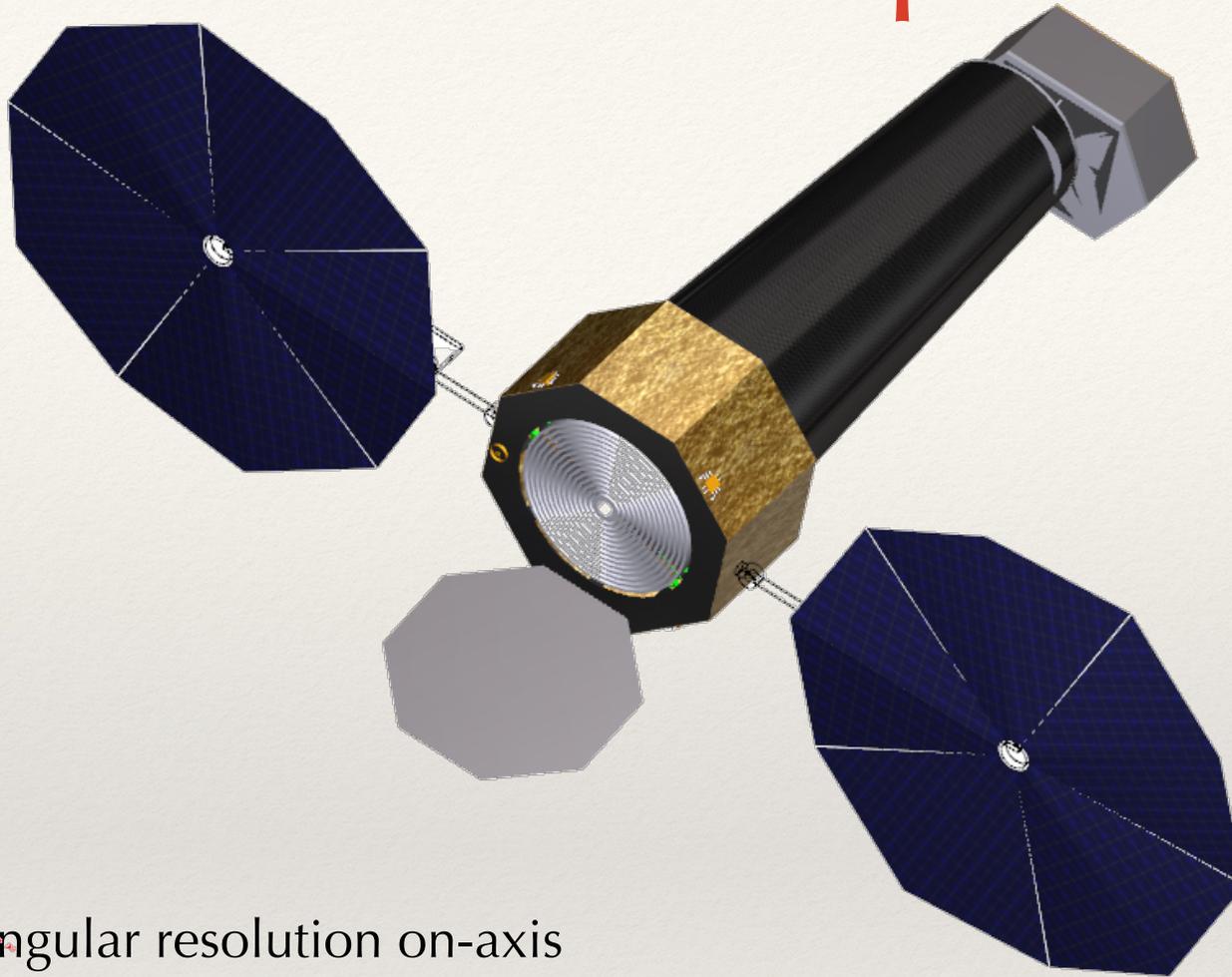
The Dawn of Black Holes



The Dawn of Black Holes



Lynx mission requirements



- 0.5" angular resolution on-axis
- 2 m², effective area at ~1 keV. Implies a 3 m diameter for the mirror system — can be accommodated by current launch vehicle fairings
- Sub-arcsec **imaging** out to 10 arcmin radius
- “Invisible Drivers” science requires very high resolution spectroscopy with **gratings** and **microcalorimeter**

Current Technical Readiness



Lynx



	Total Gaps	TRL 2 Gaps	TRL 3 Gaps	TRL 4+ Gaps
Enabling+ enhancing	5	1	3	1
Enabling only	5	1	3	1

ID	Technology Gap	TRL	Note
1	High-resolution lightweight X-ray optics	2	Should the required system-level angular resolution be achievable with mirror-level resolution of 2 arcsec, and/or if the factor currently limiting mirror-level performance to 2 arcsec and a credible technological extension are identified, this TRL would be at 3.
2	Non-deforming X-ray reflecting coatings	3	Thin glass substrate coated with Pt showed identical thickness coatings on two sides resulted in minimal net distortion
3	Megapixel X-ray imaging detectors	3	
4	Large-format, high spectral resolution X-ray detectors	3	
5	X-ray grating arrays	4	

from the recent Pause and Learn presentation from Decadal Studies Technology Assessment

