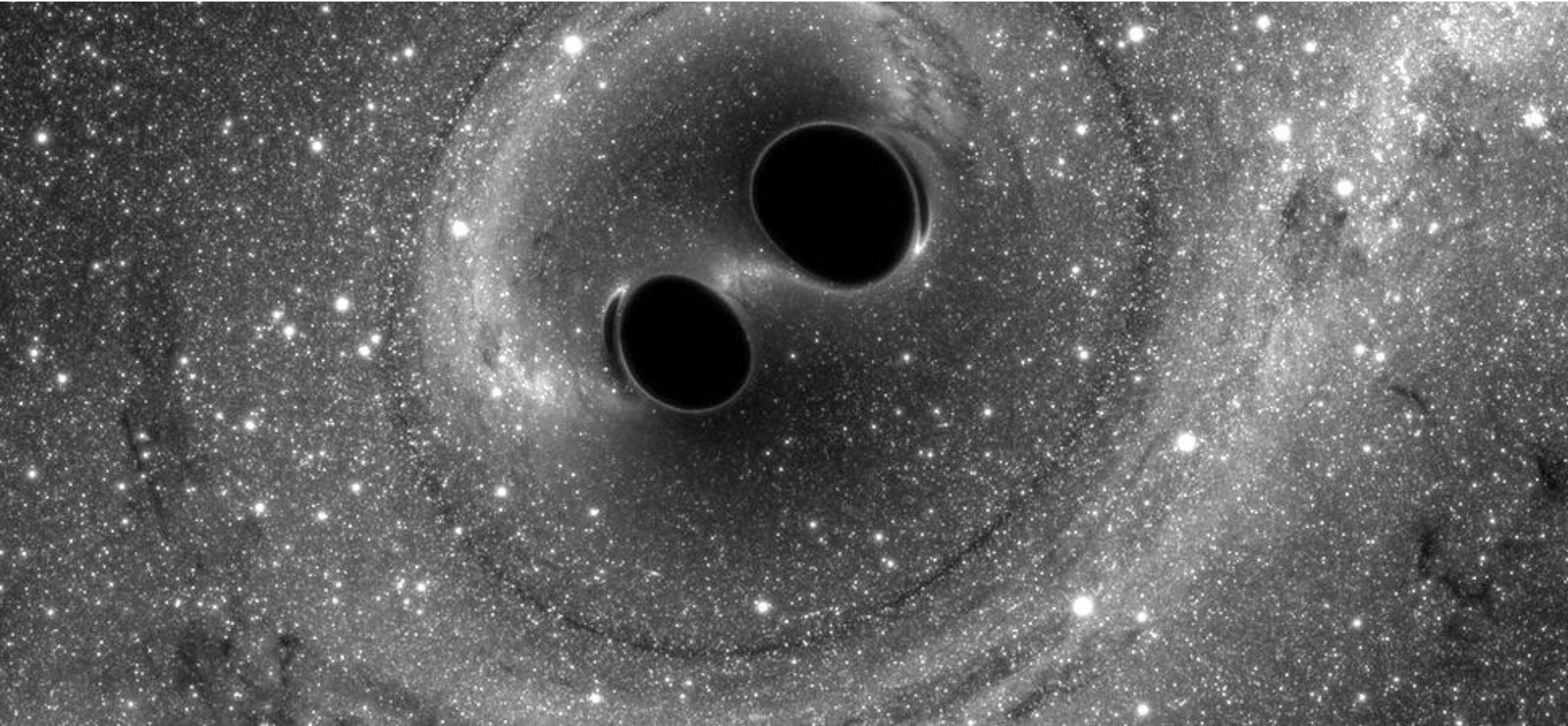
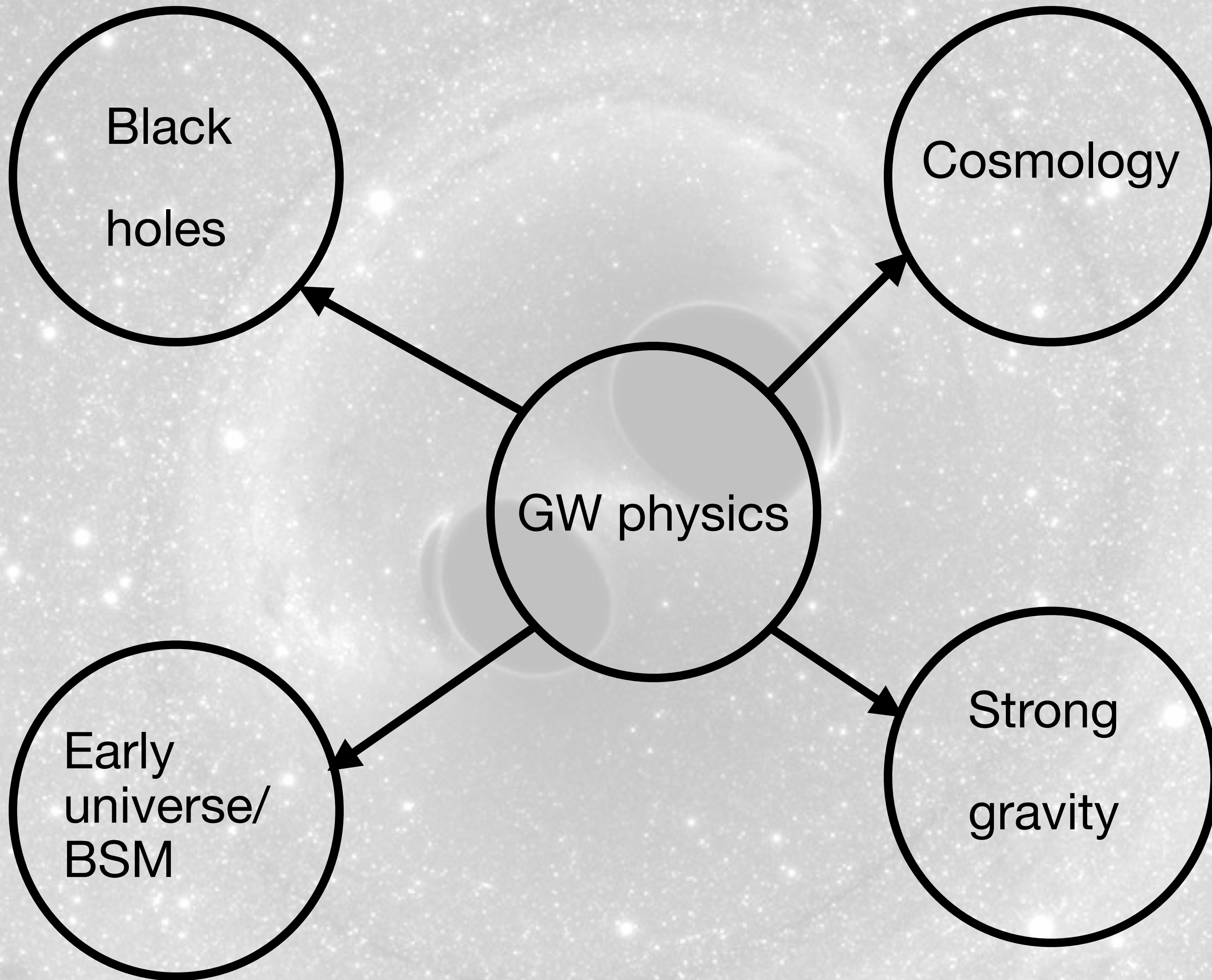
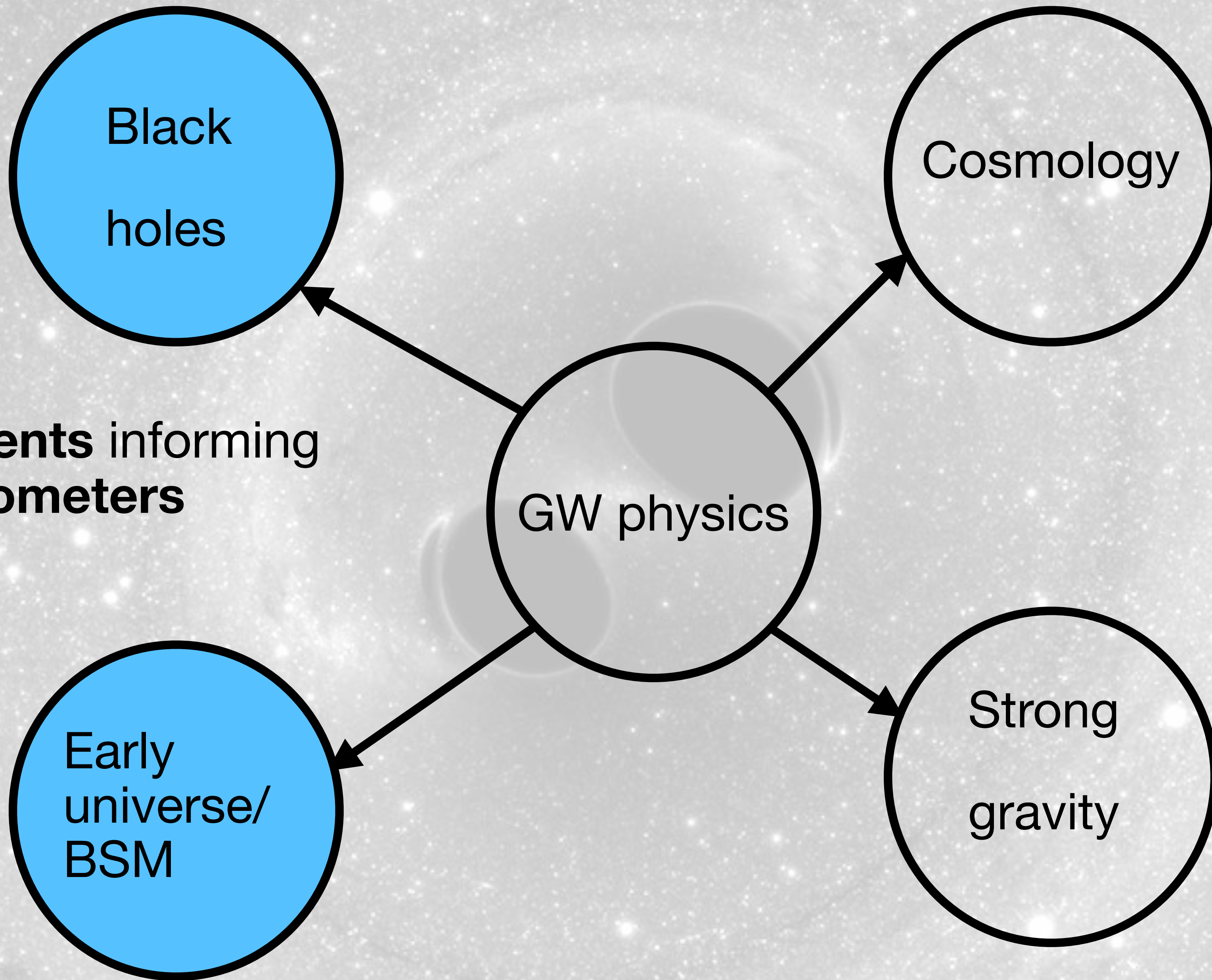


DeciHz Synergies

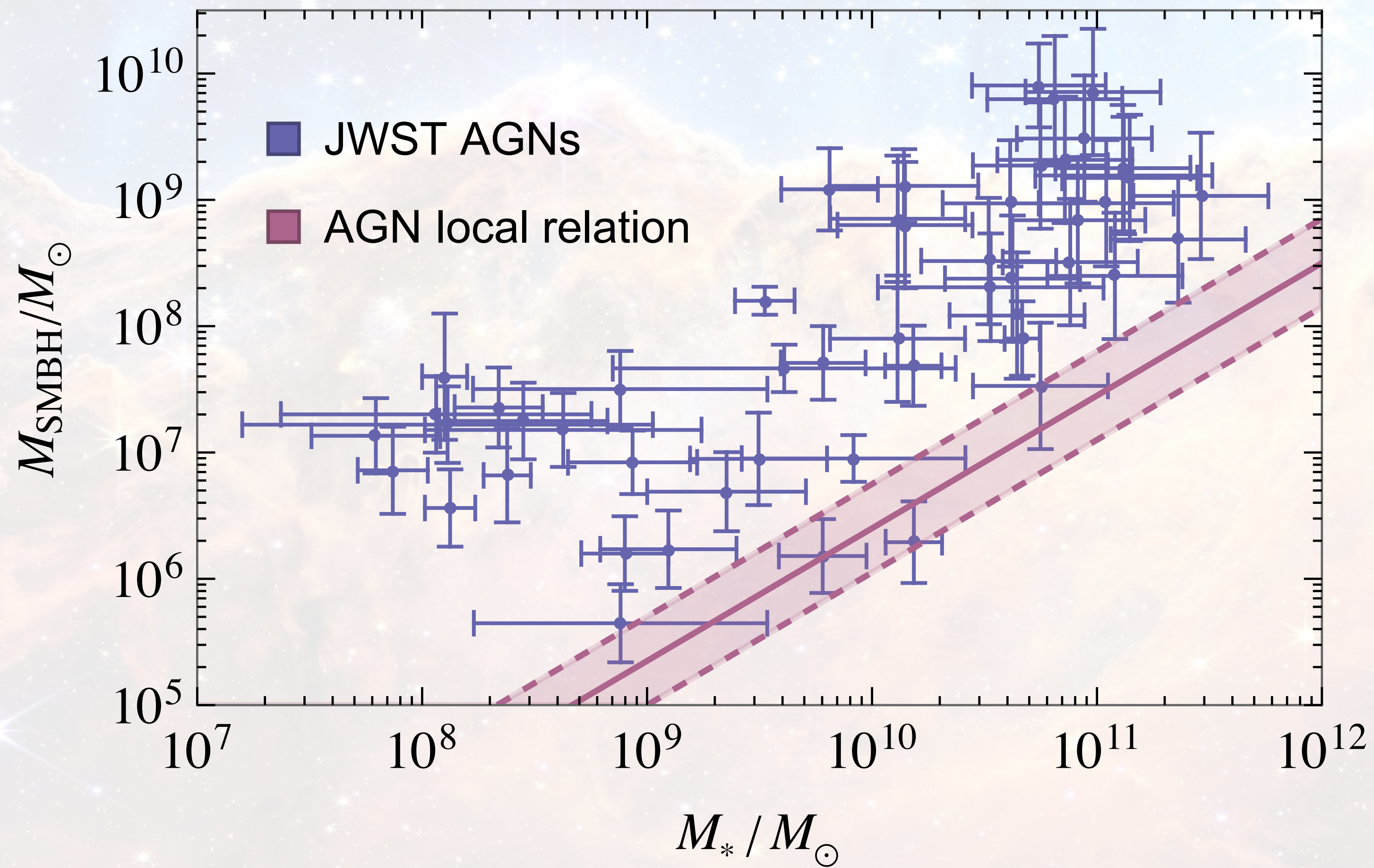






New experiments informing
atom interferometers
predictions!

JWST observations



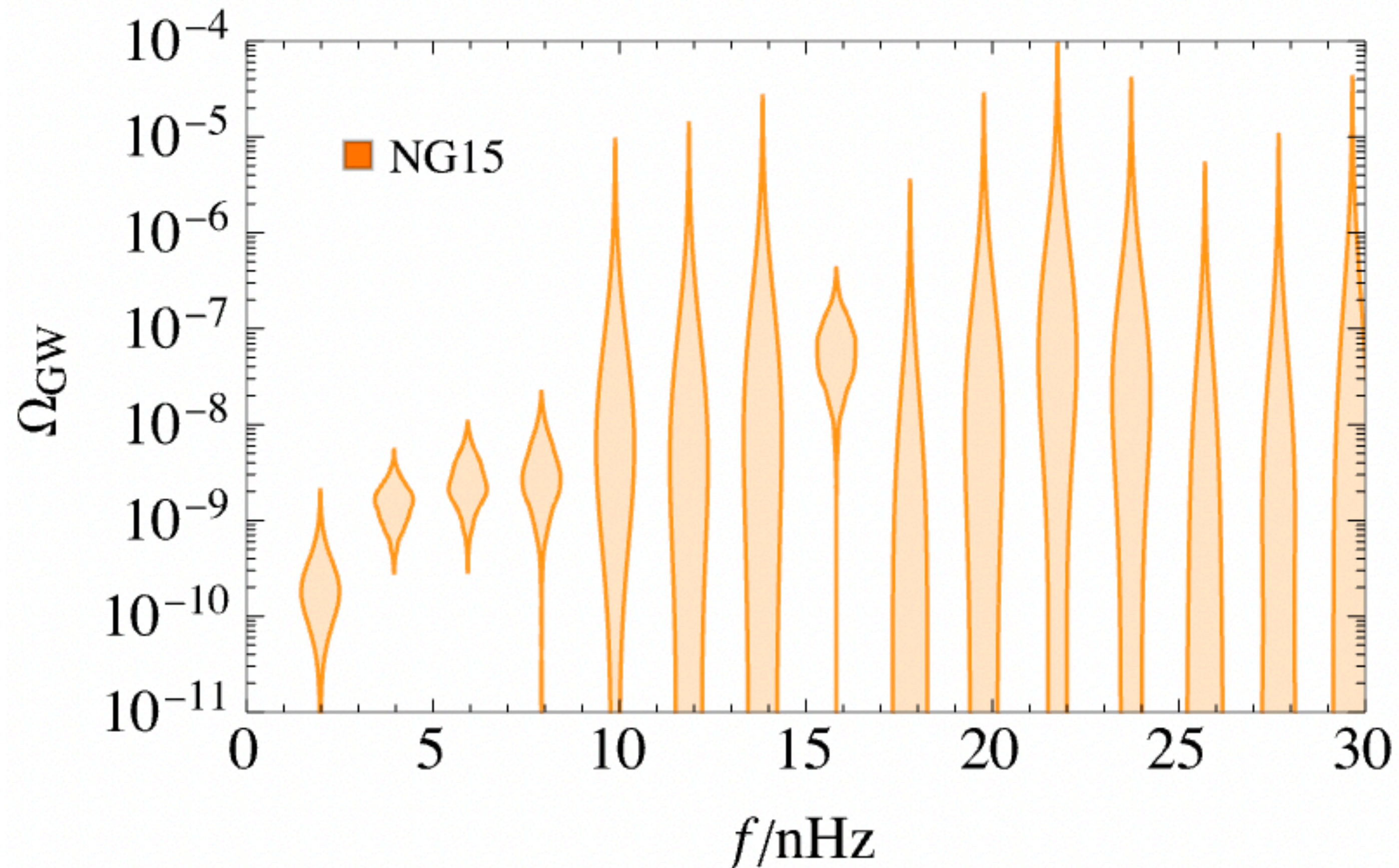
PTA observations

- The use of millisecond pulsars as clocks positioned around the galaxy to measure GW \mathcal{O} (kpc)
- which correspond to frequencies at around \mathcal{O} (nHz), ~ 30 yr



PTA observations

Previously (12.5 yr data release) was just a constant amplitude band

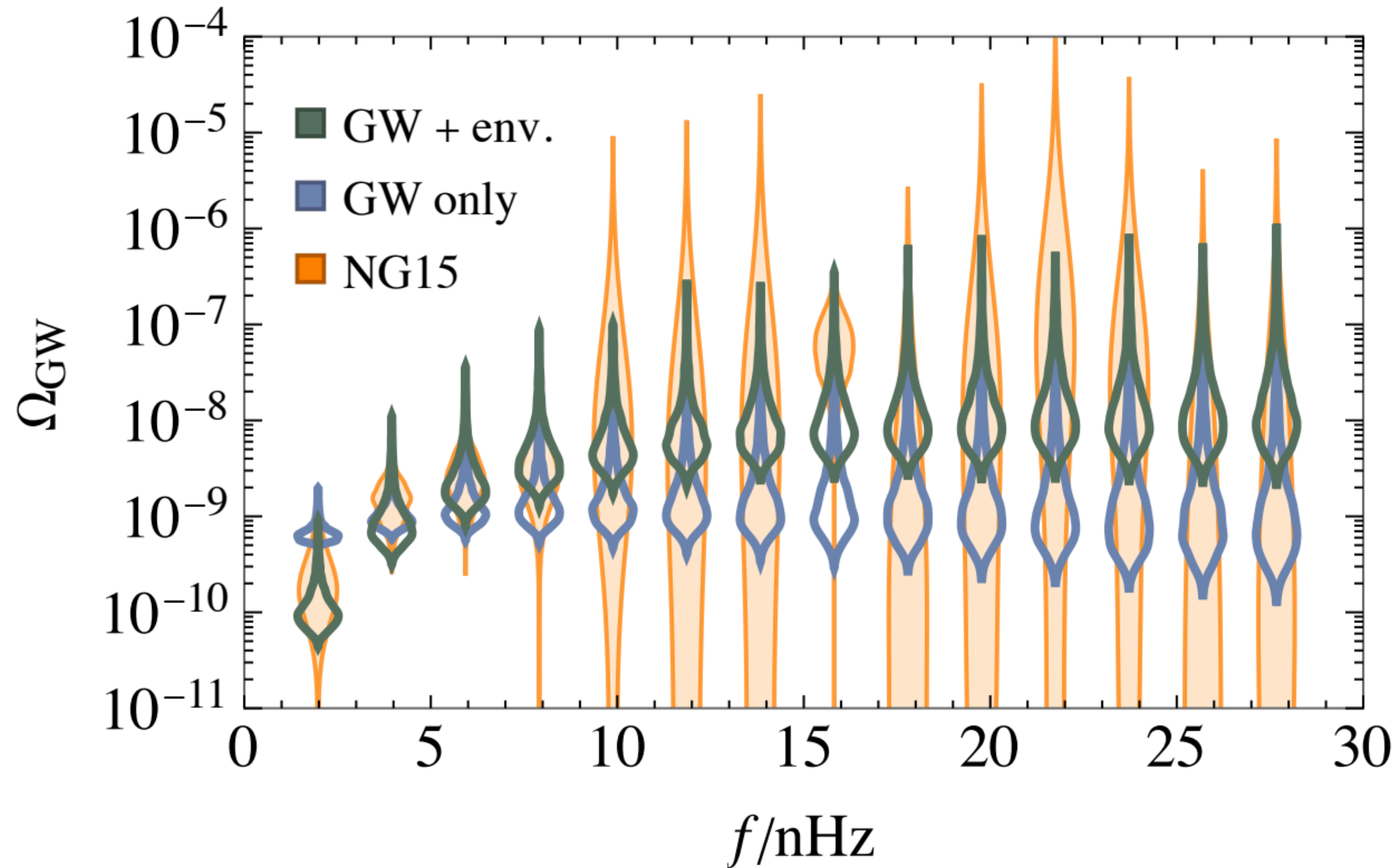


The background of the image is a grayscale representation of a galaxy, likely a barred spiral galaxy, with a prominent bright central core and a diffuse, glowing structure. The text is centered over this background.

**If the PTA signal comes from
SMBH binaries**

SMBH interpretation

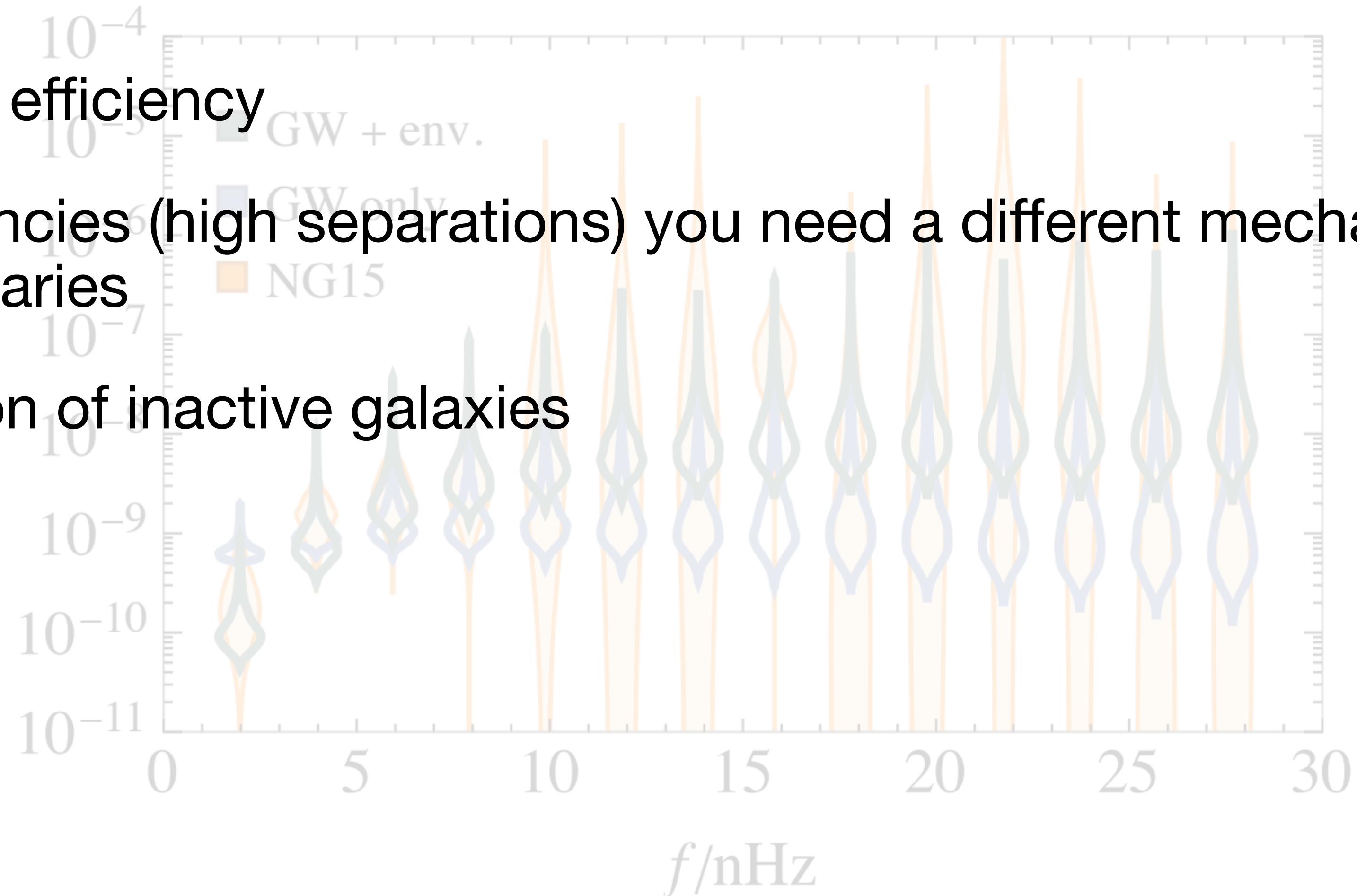
Fits the data very well under certain assumptions



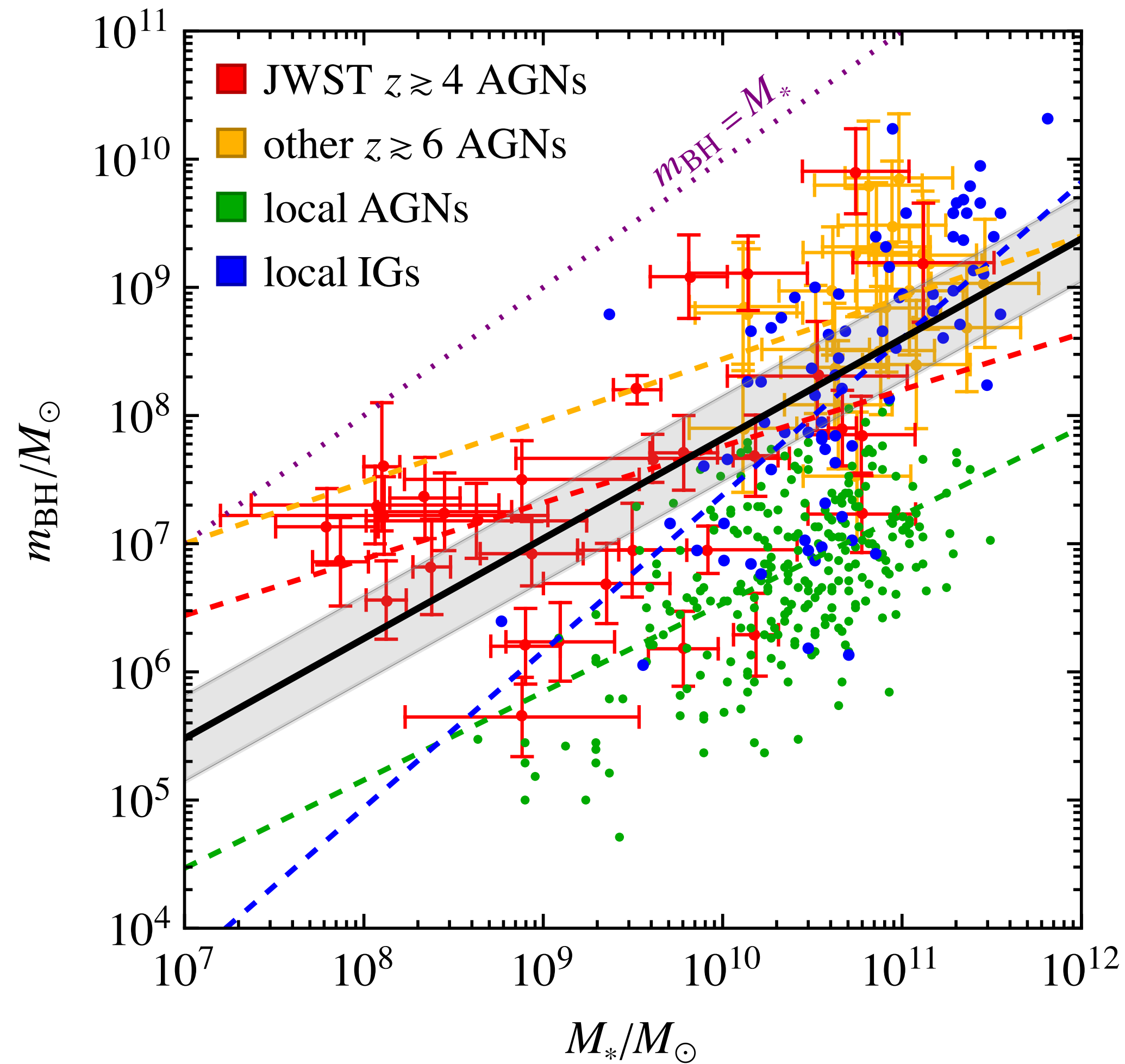
SMBH interpretation

Fits the data very well under certain assumptions

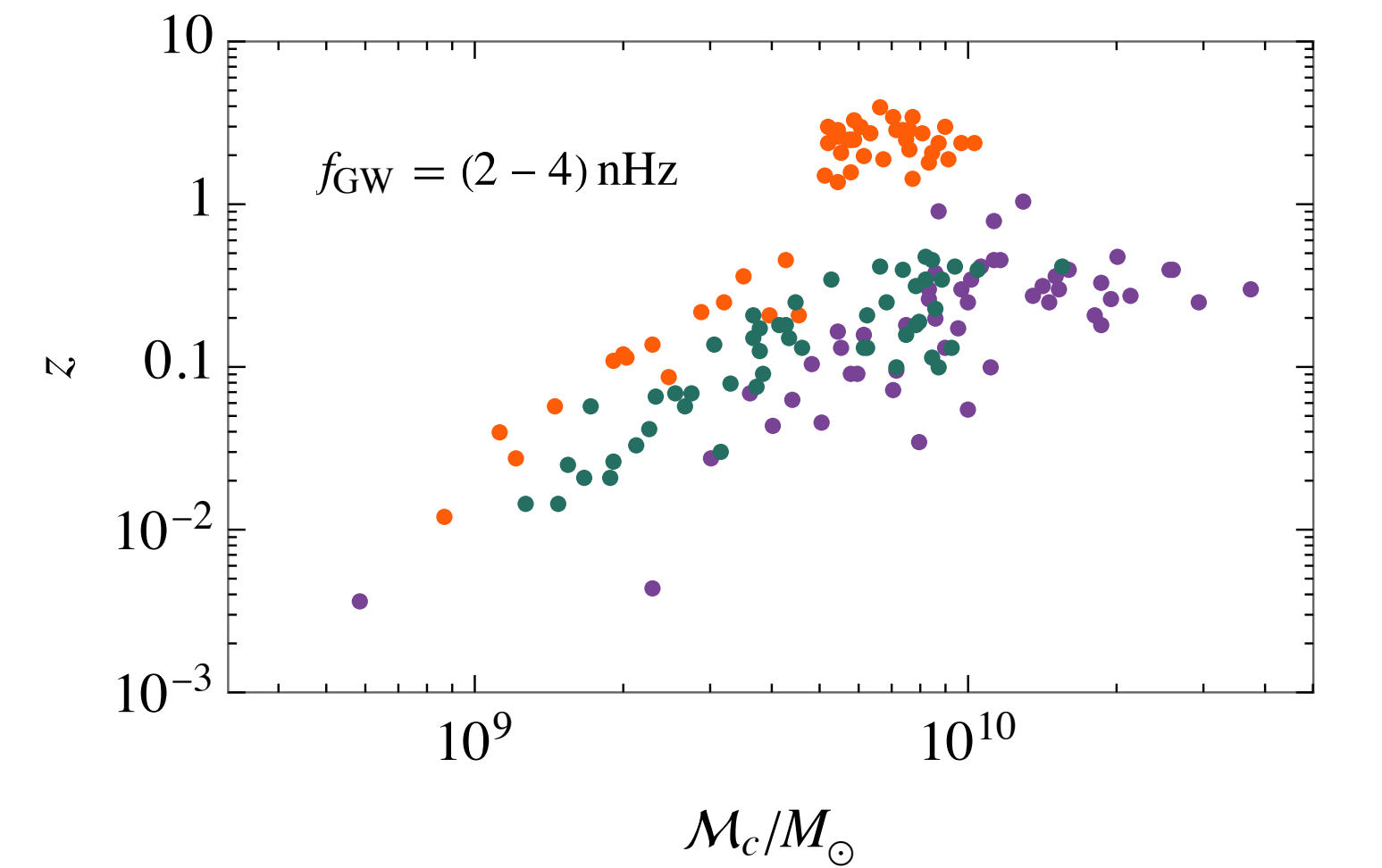
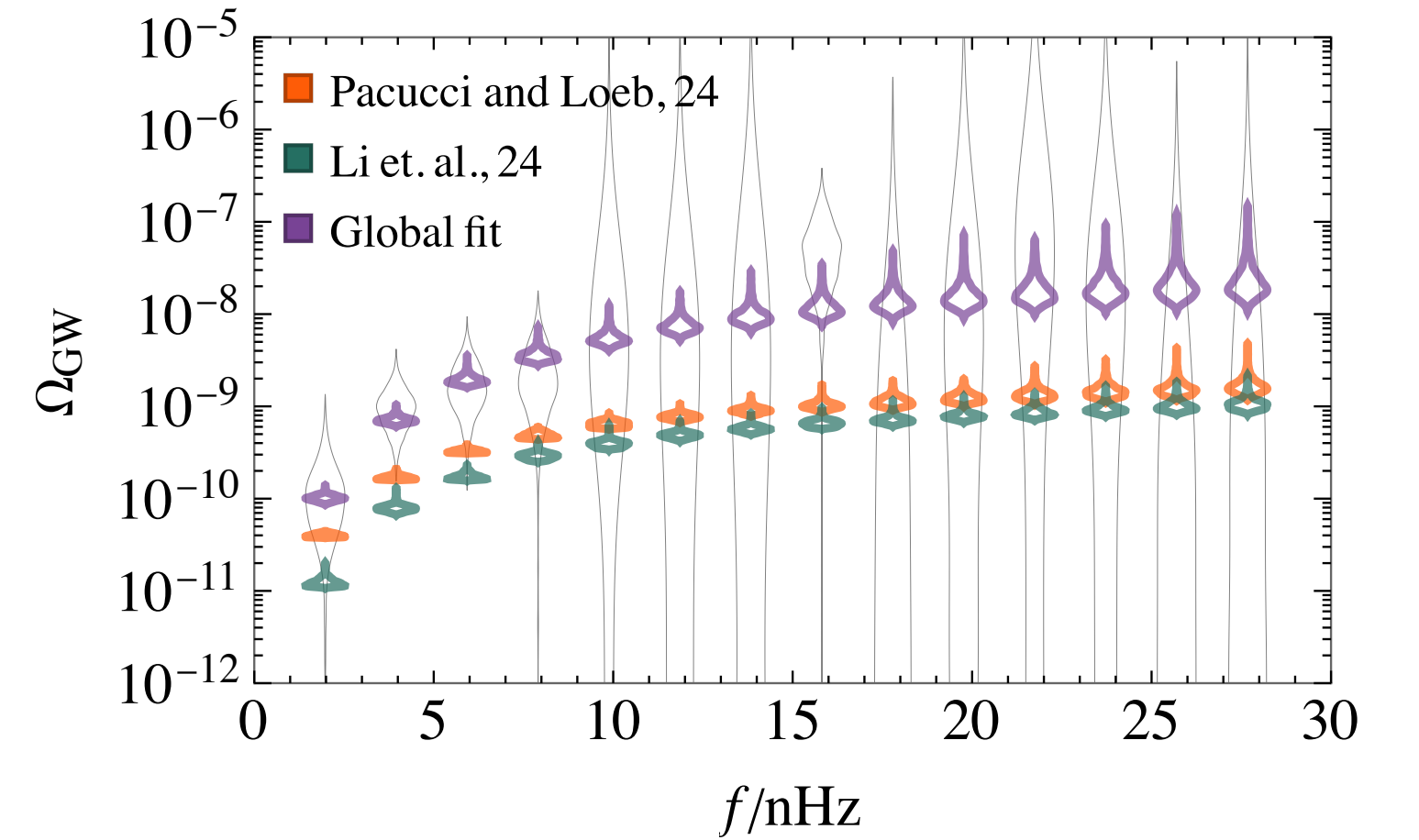
- High-merging efficiency
- At low-frequencies (high separations) you need a different mechanism to evolve the binaries
- Scaling relation of inactive galaxies

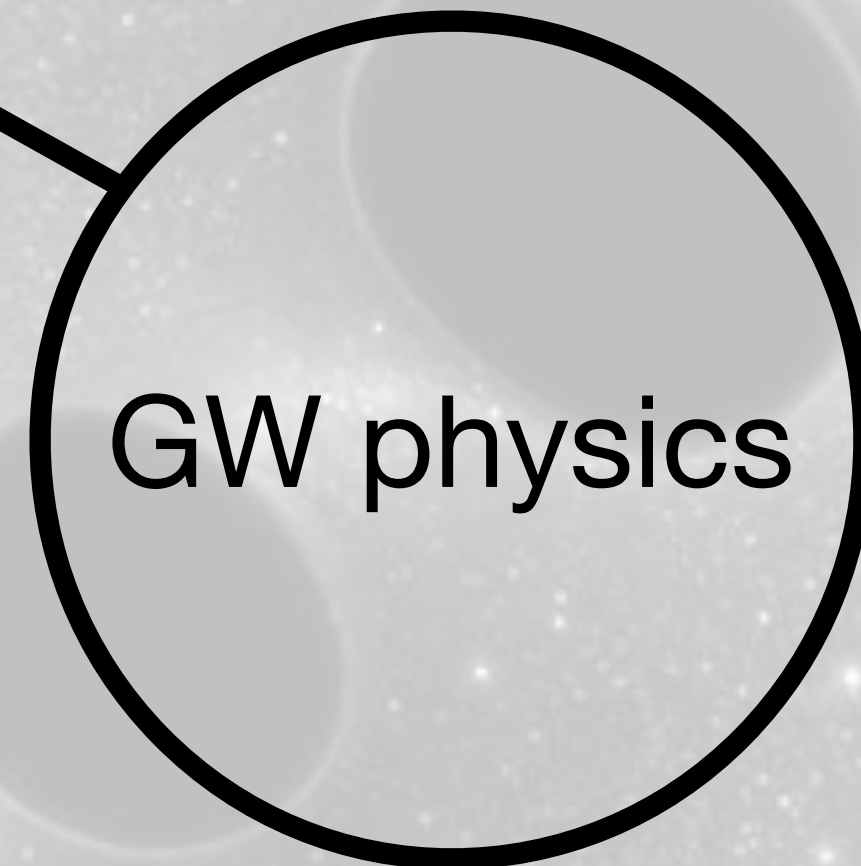
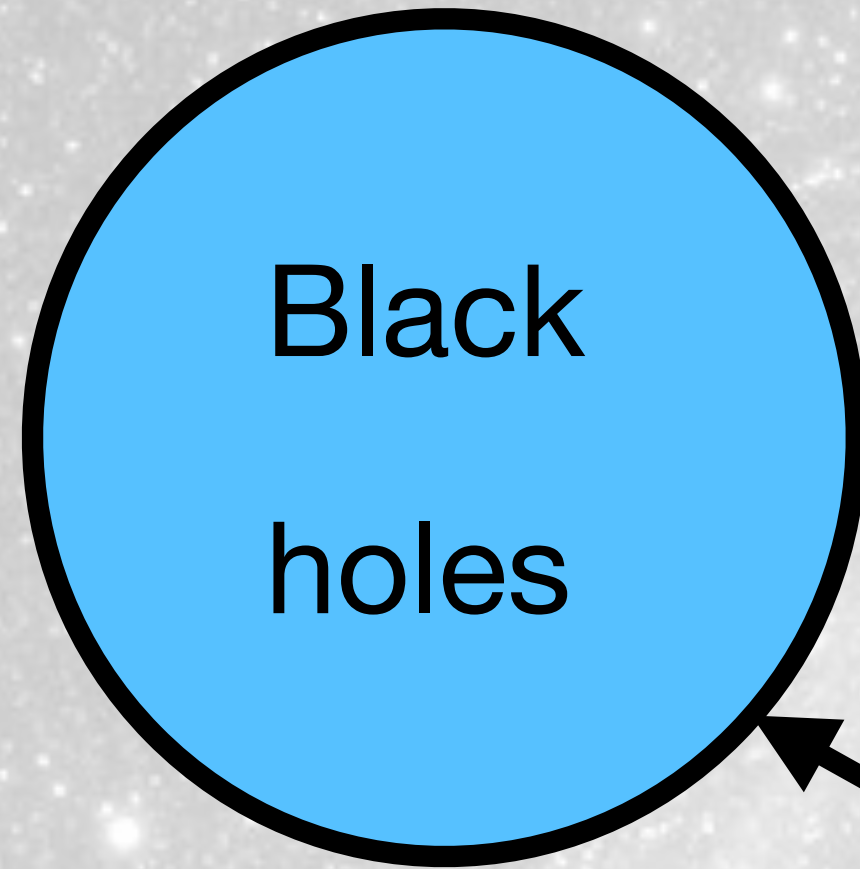


Connection to JWST observations



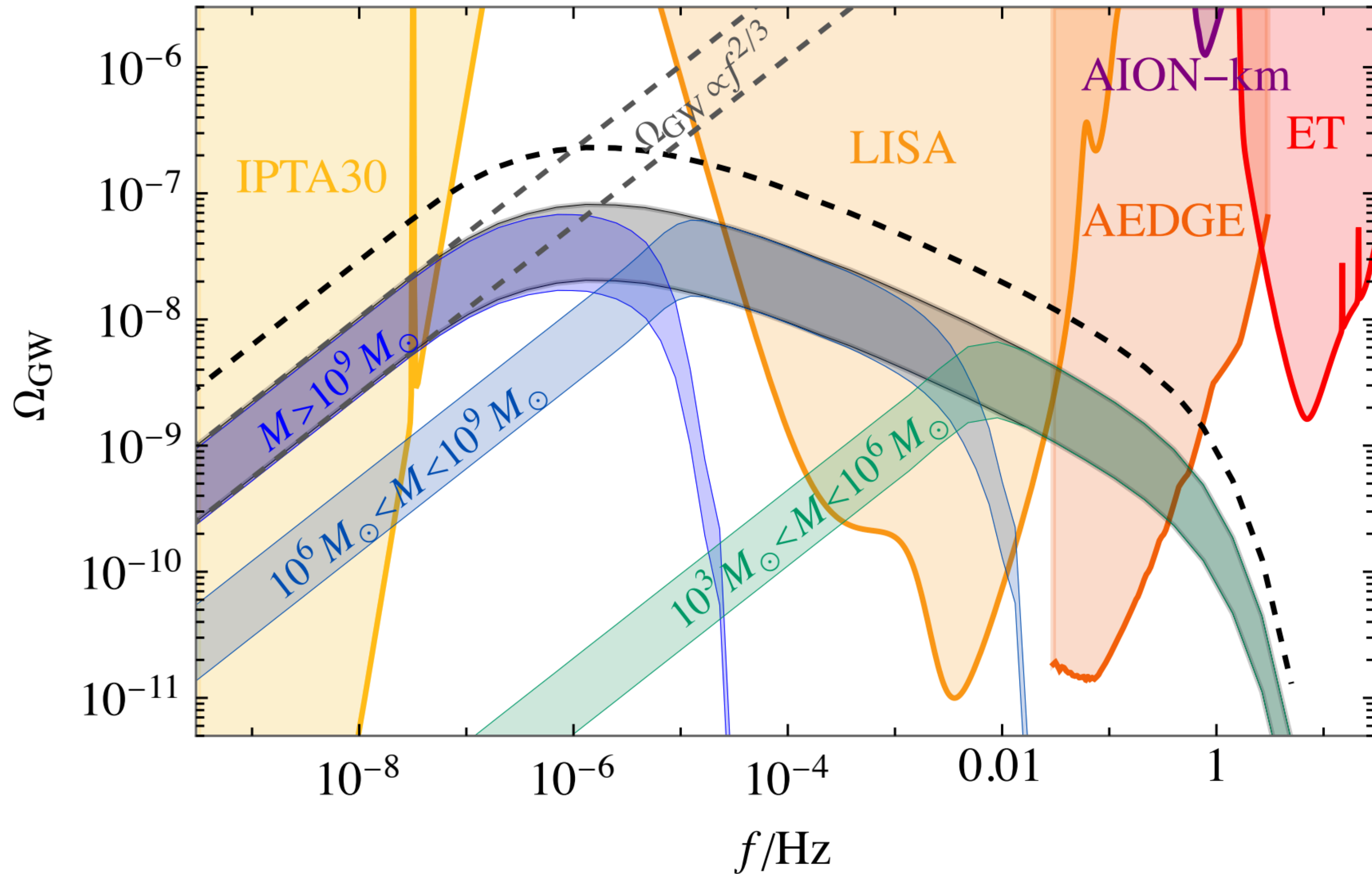
PTA observations can help us to constraint JWST interpretations



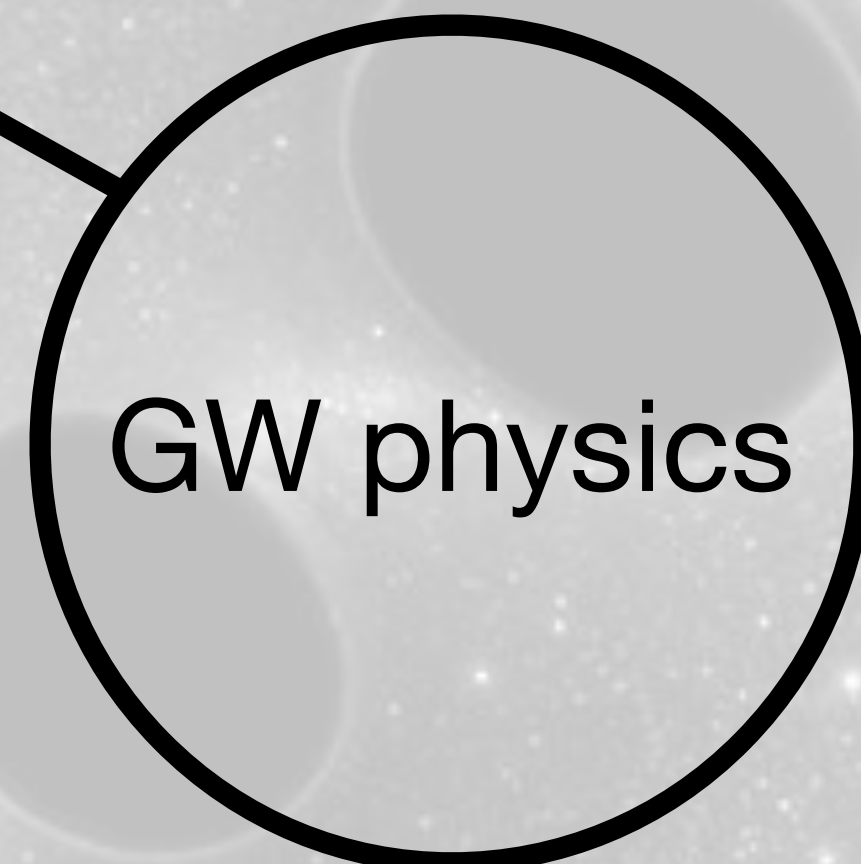
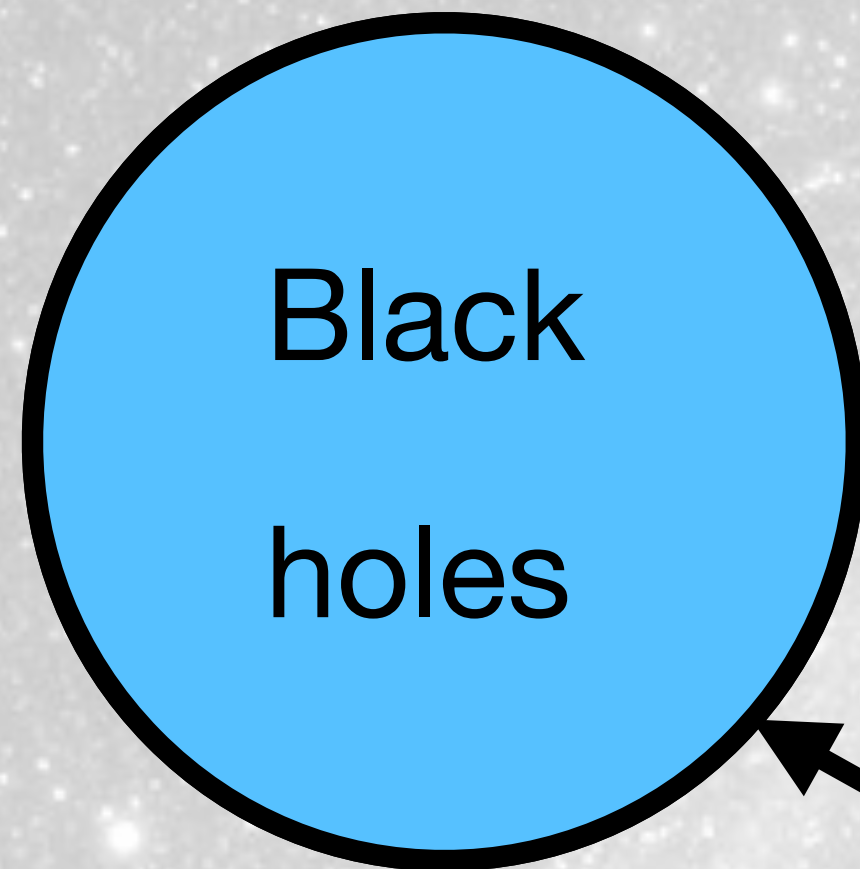


-Population of SMBH/IMBH

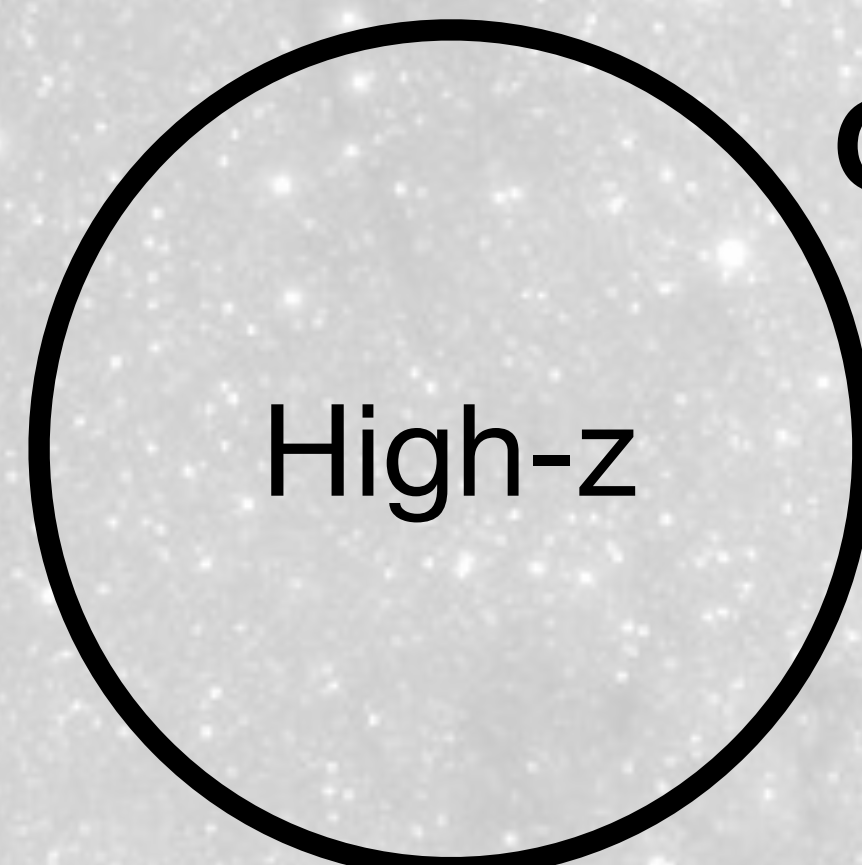
It is possible to extend the model to higher f



Explore the population with more precision and in a wider range



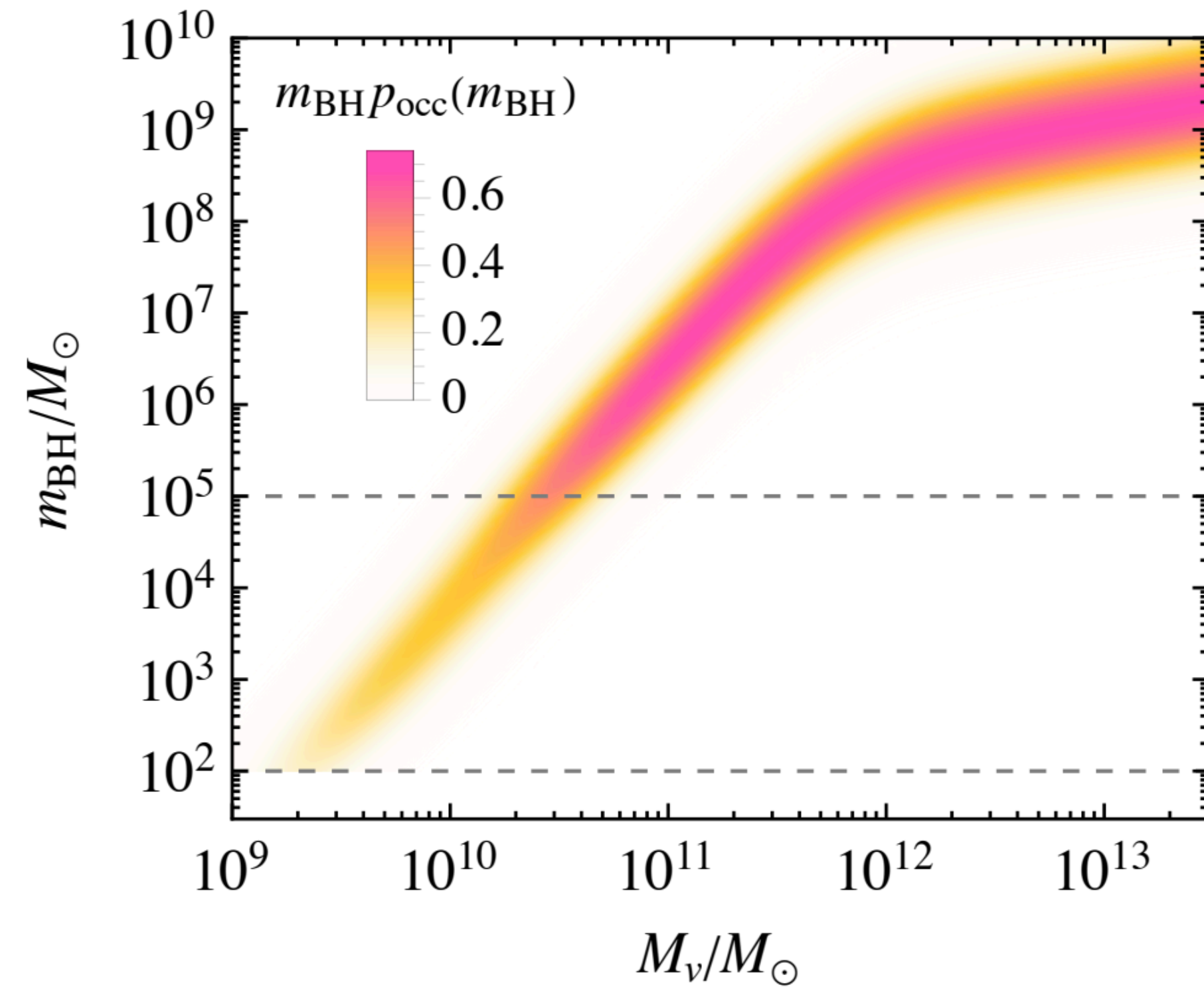
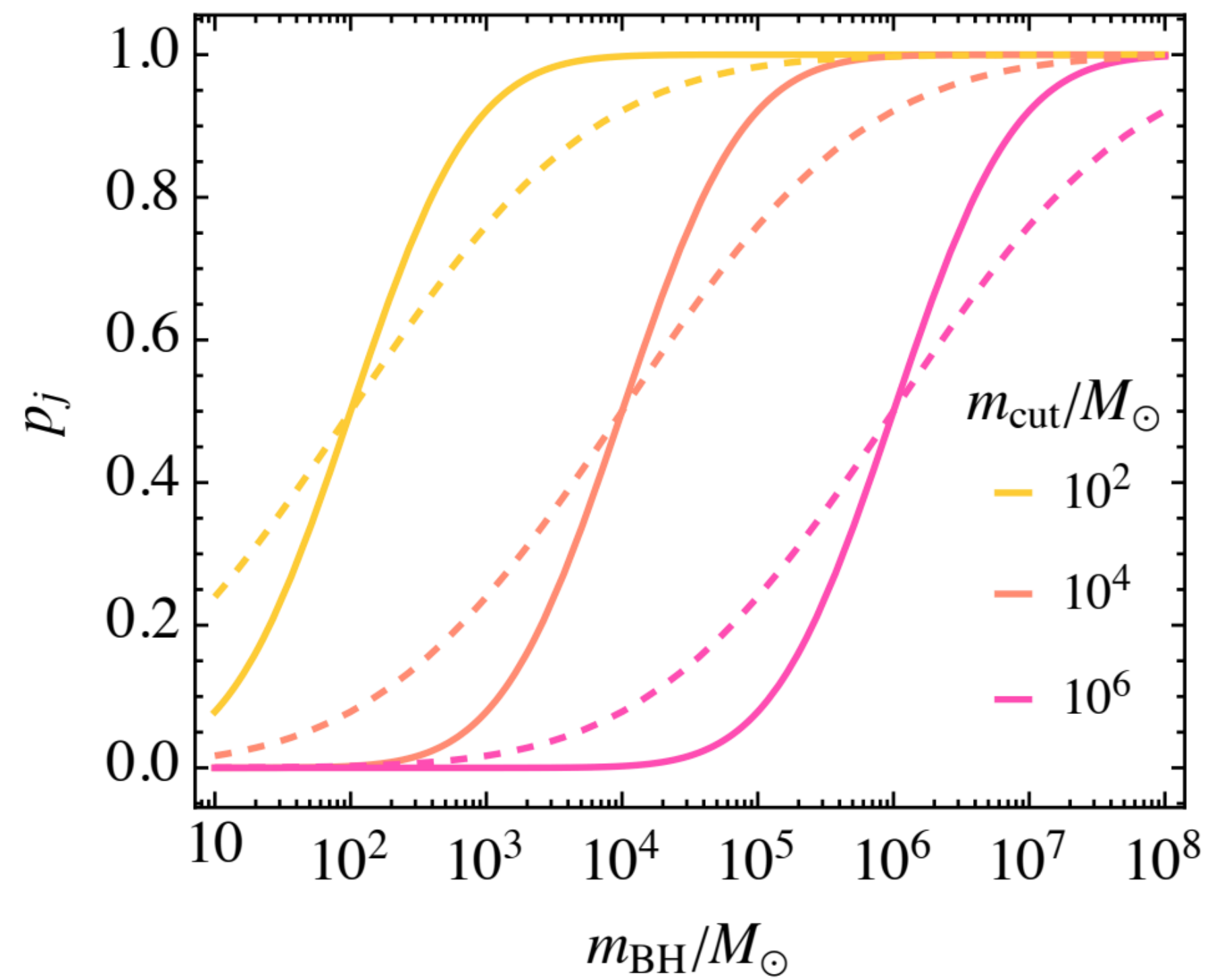
-Origin and evolution



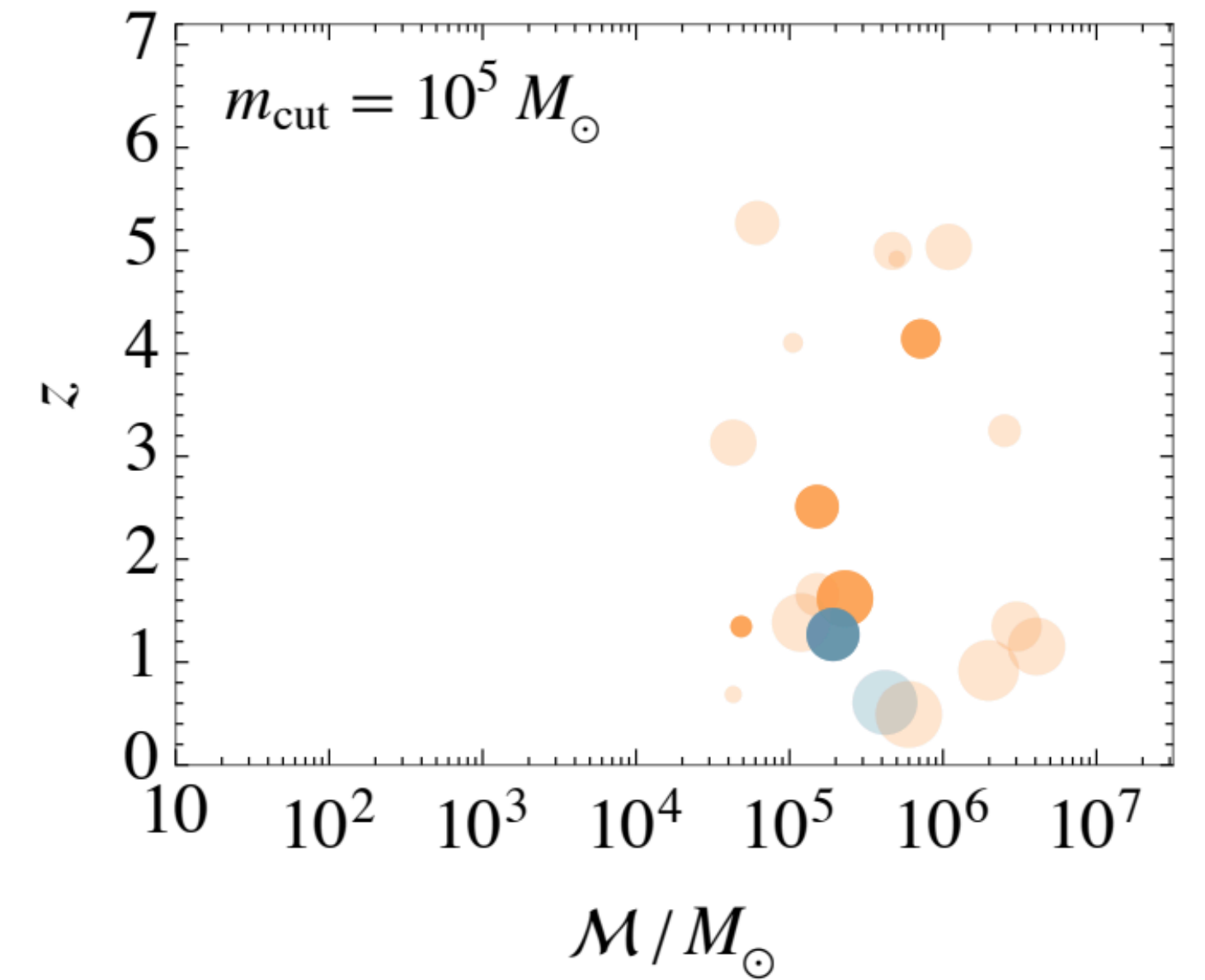
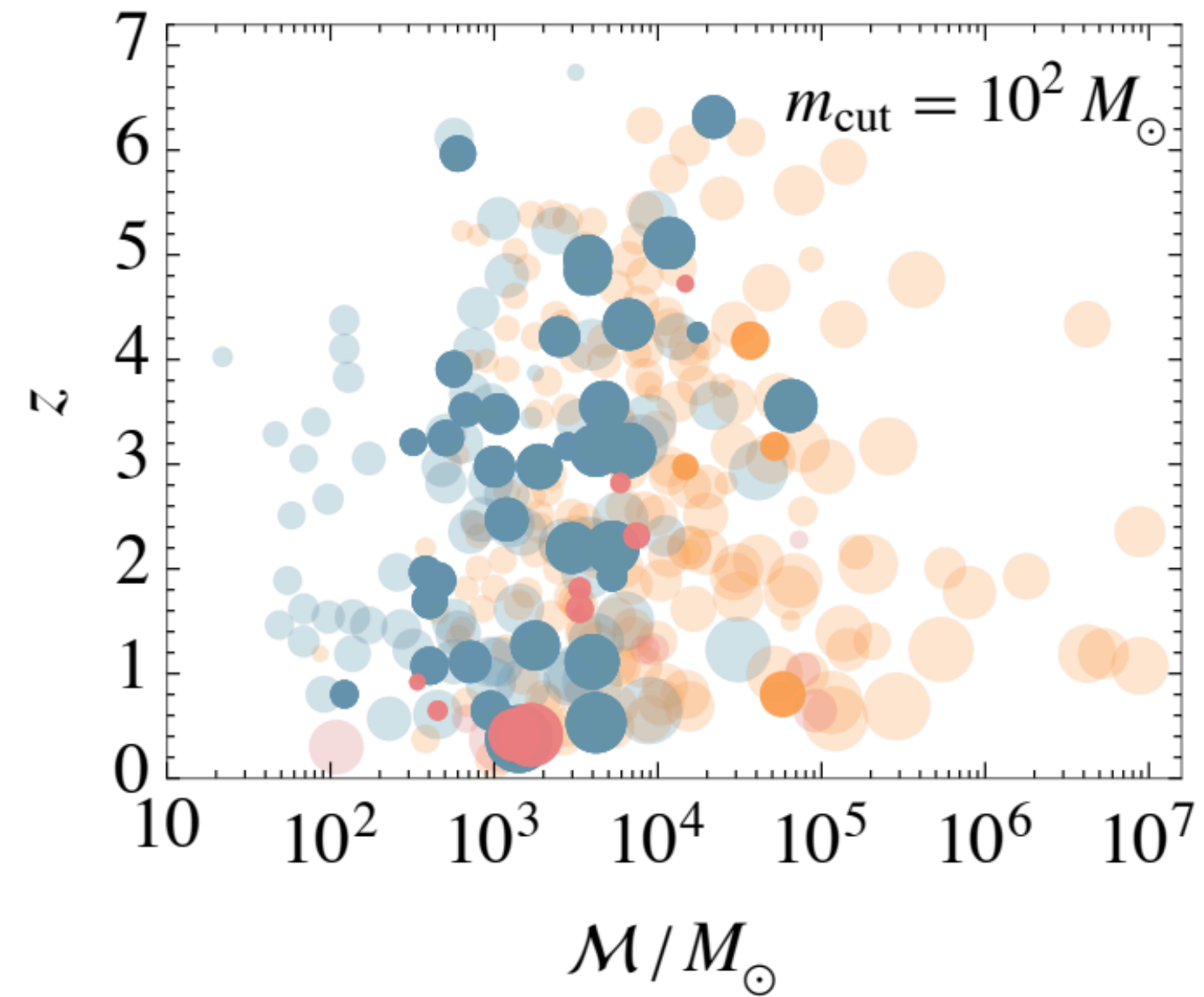
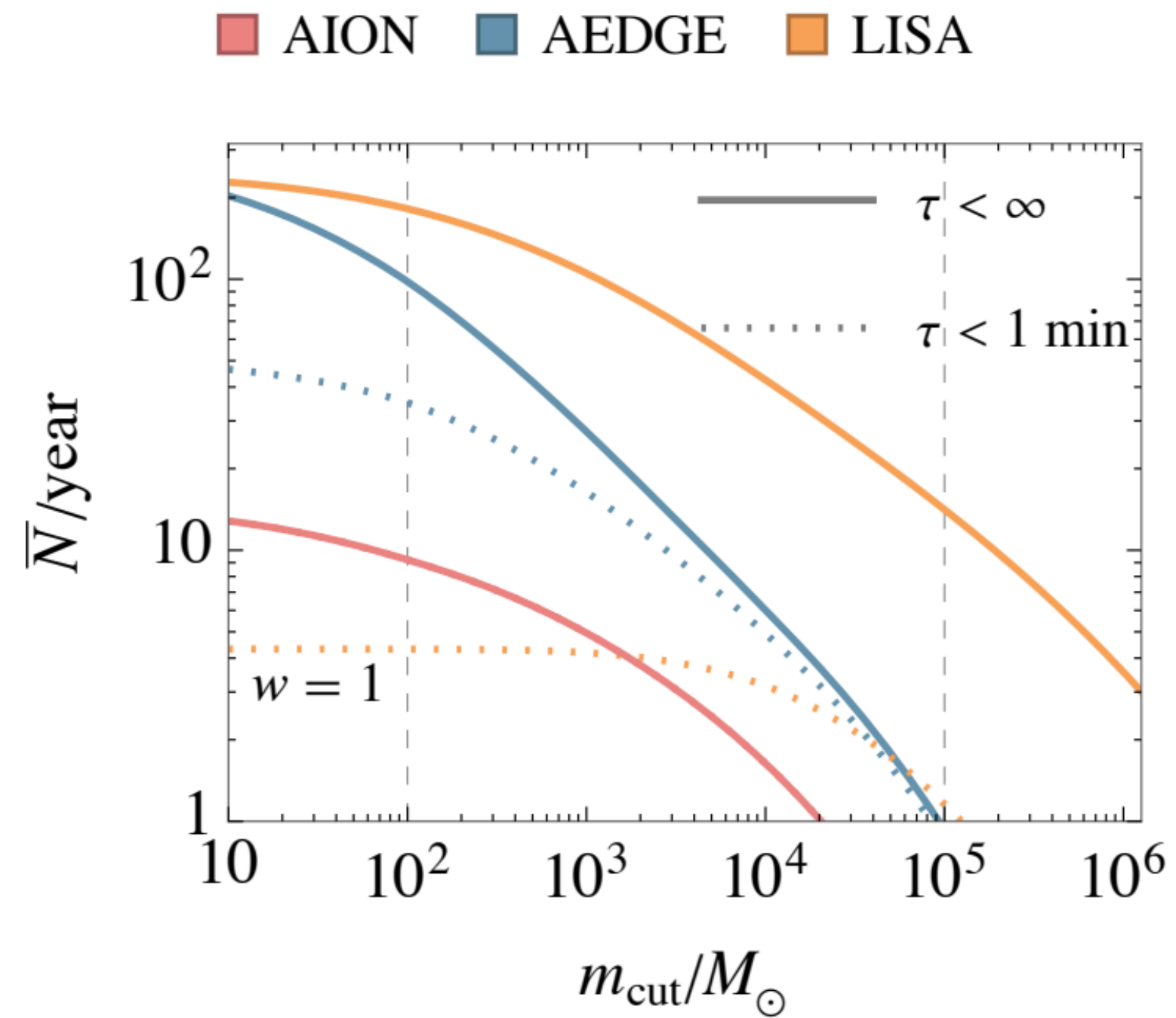
Observations



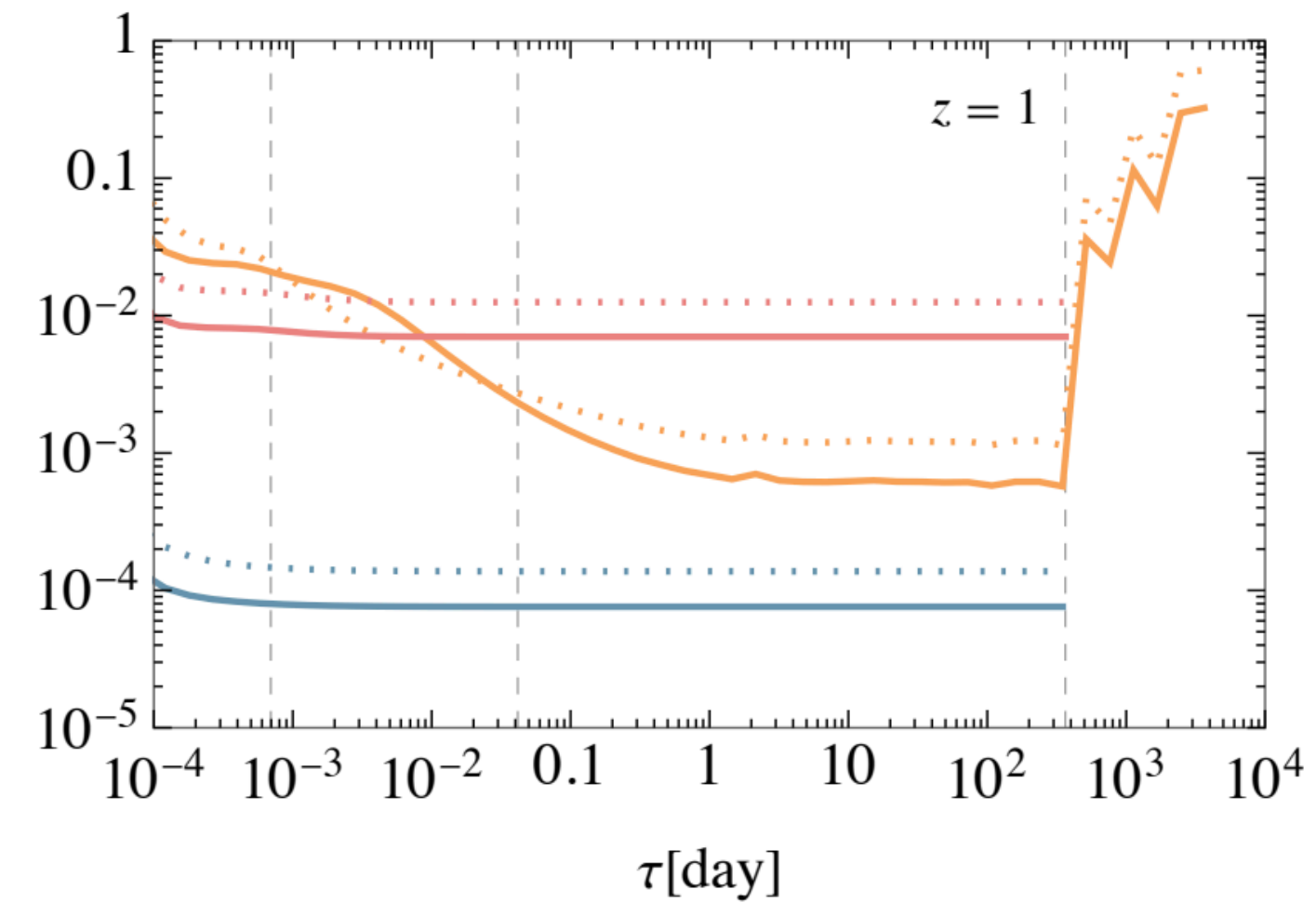
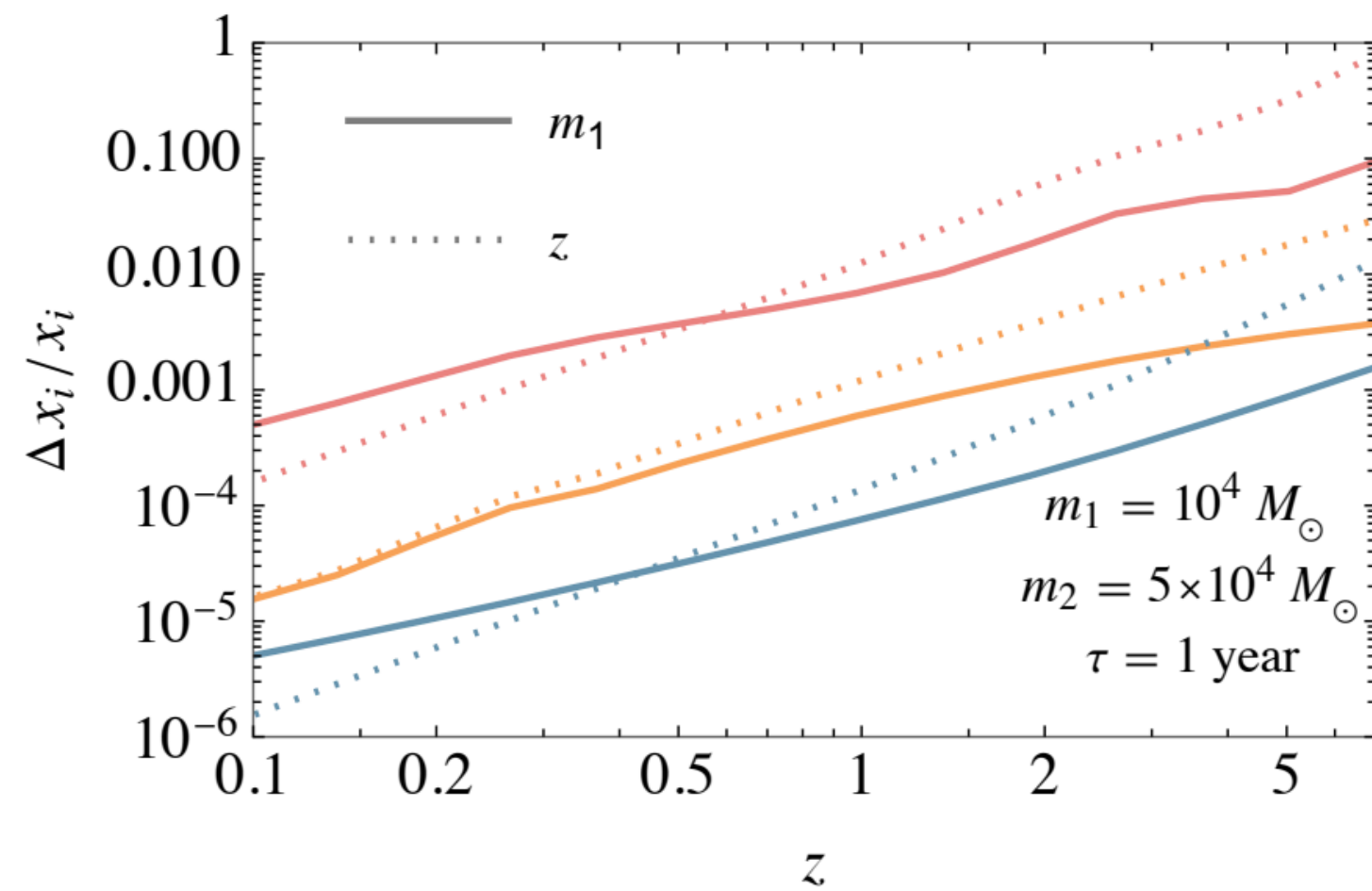
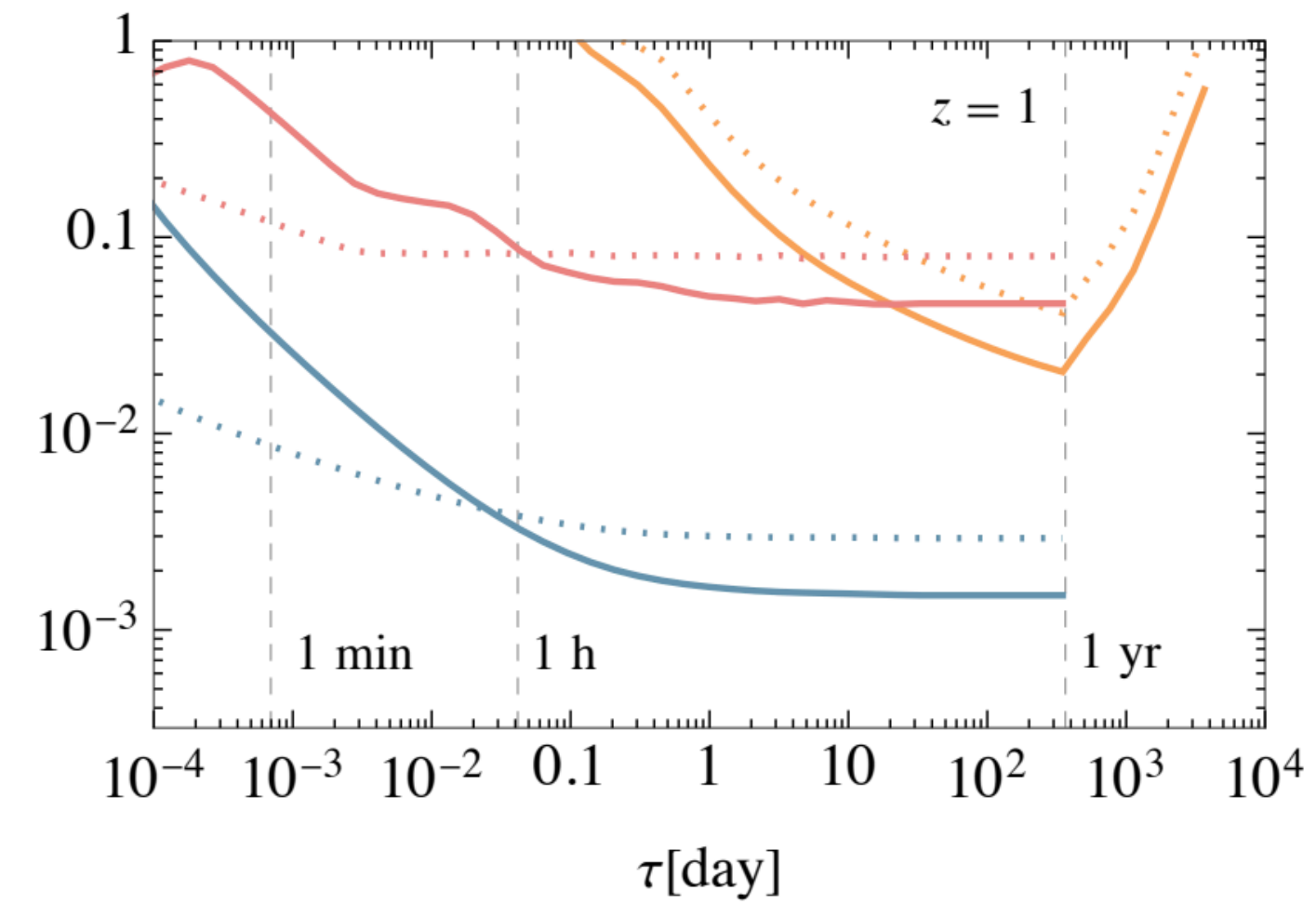
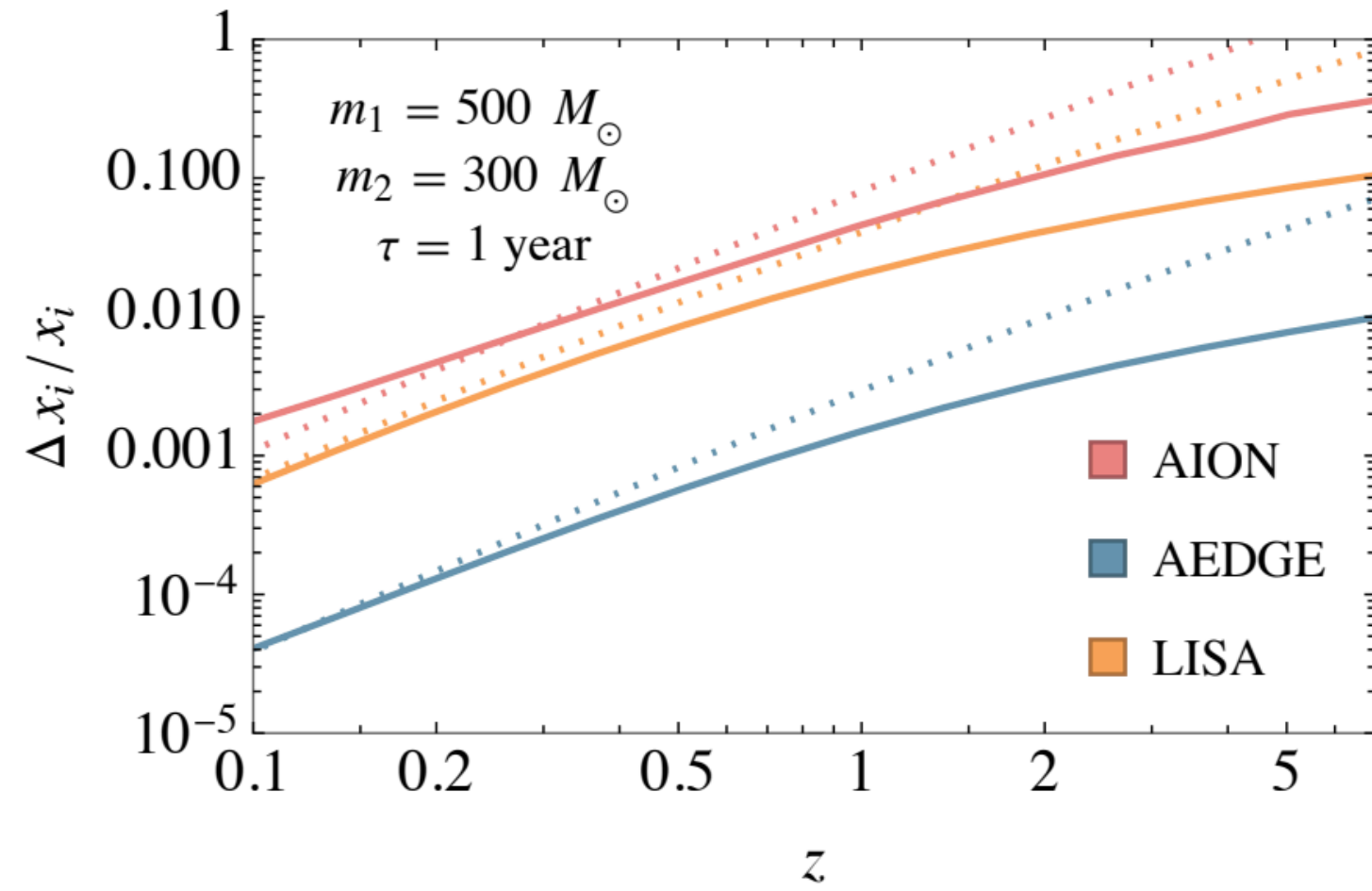
Explore the occupation fraction



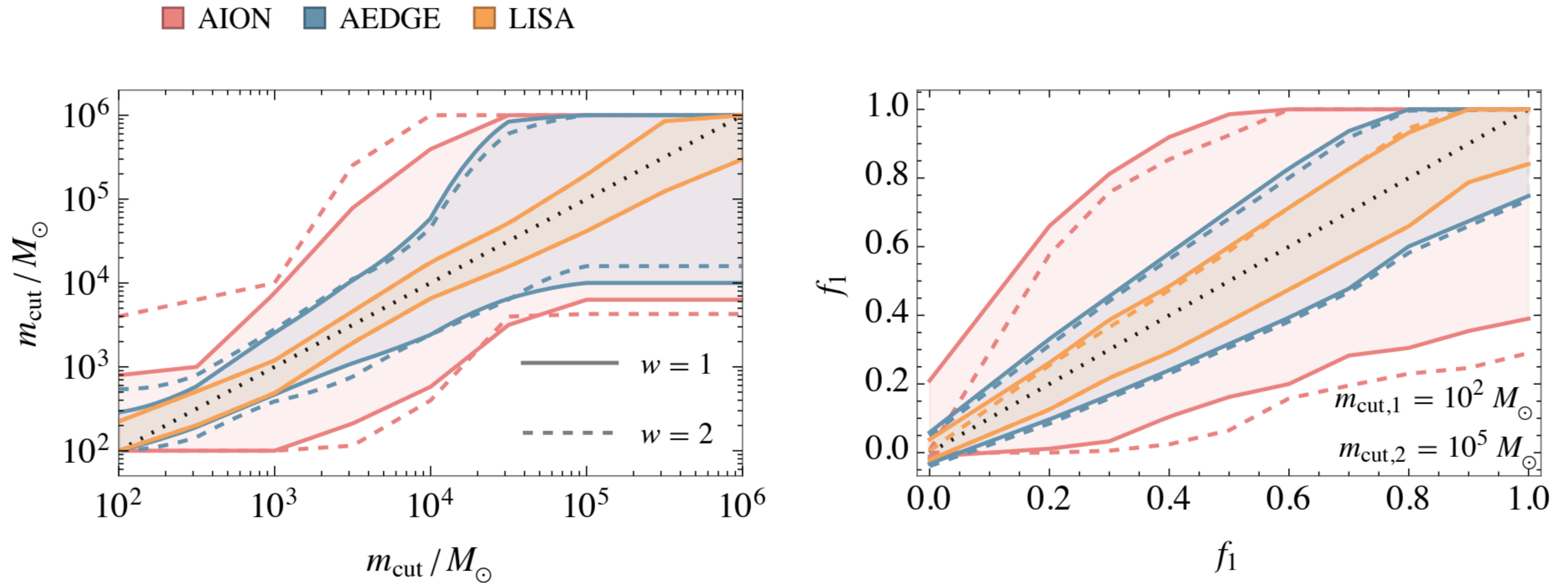
Explore the occupation fraction

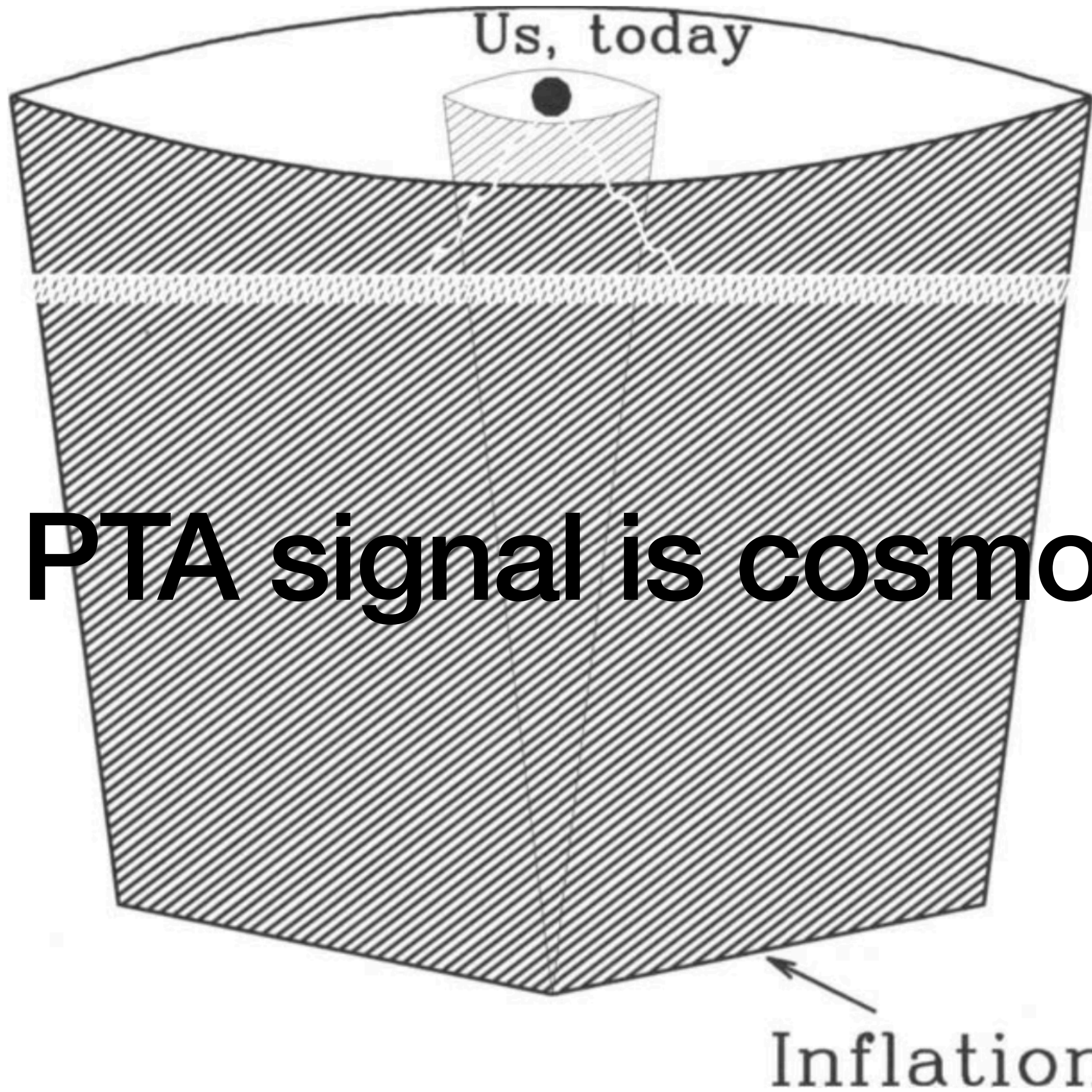


Explore the occupation fraction



Explore the occupation fraction





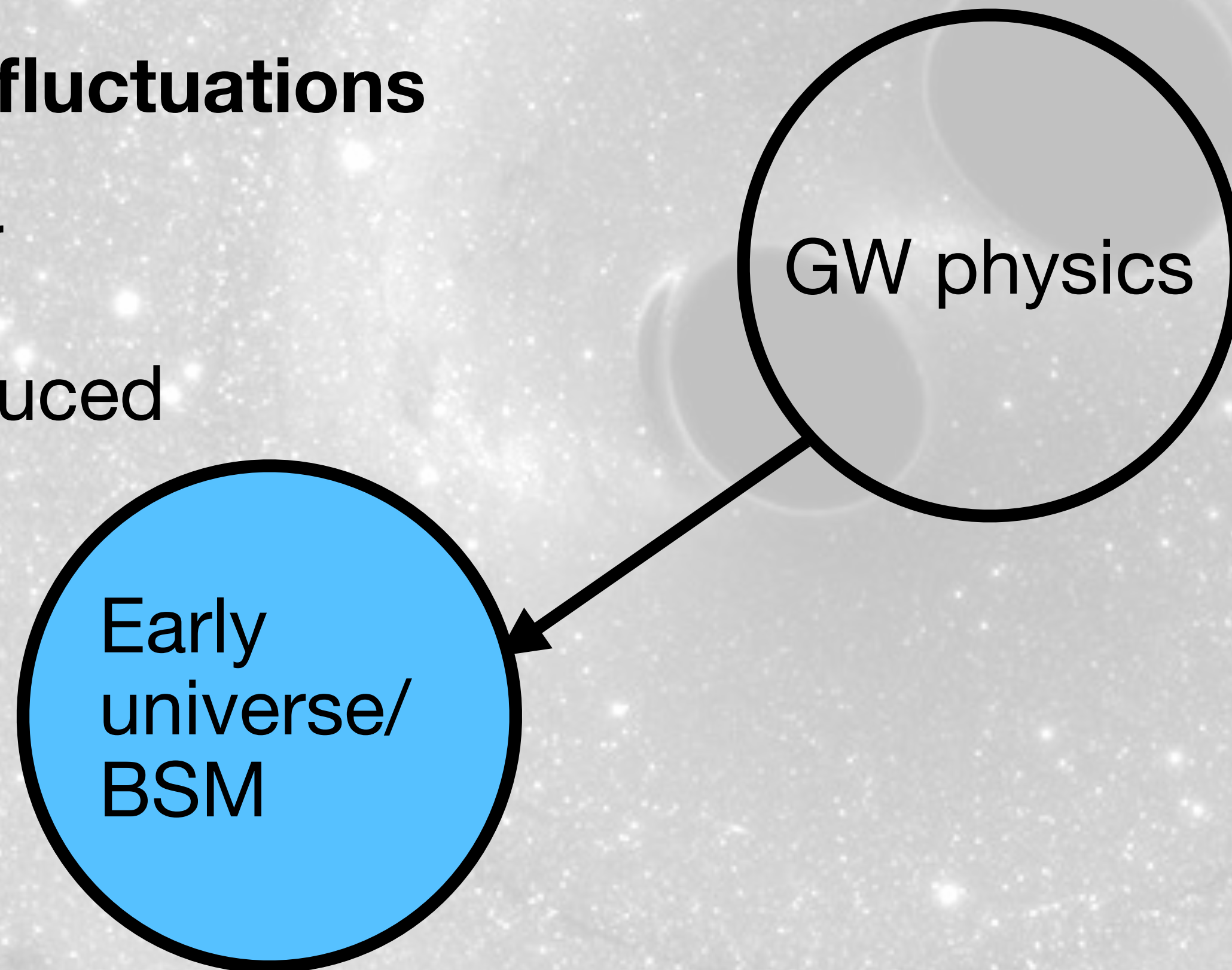
If the PTA signal is cosmological

-BSM particles+expanding background

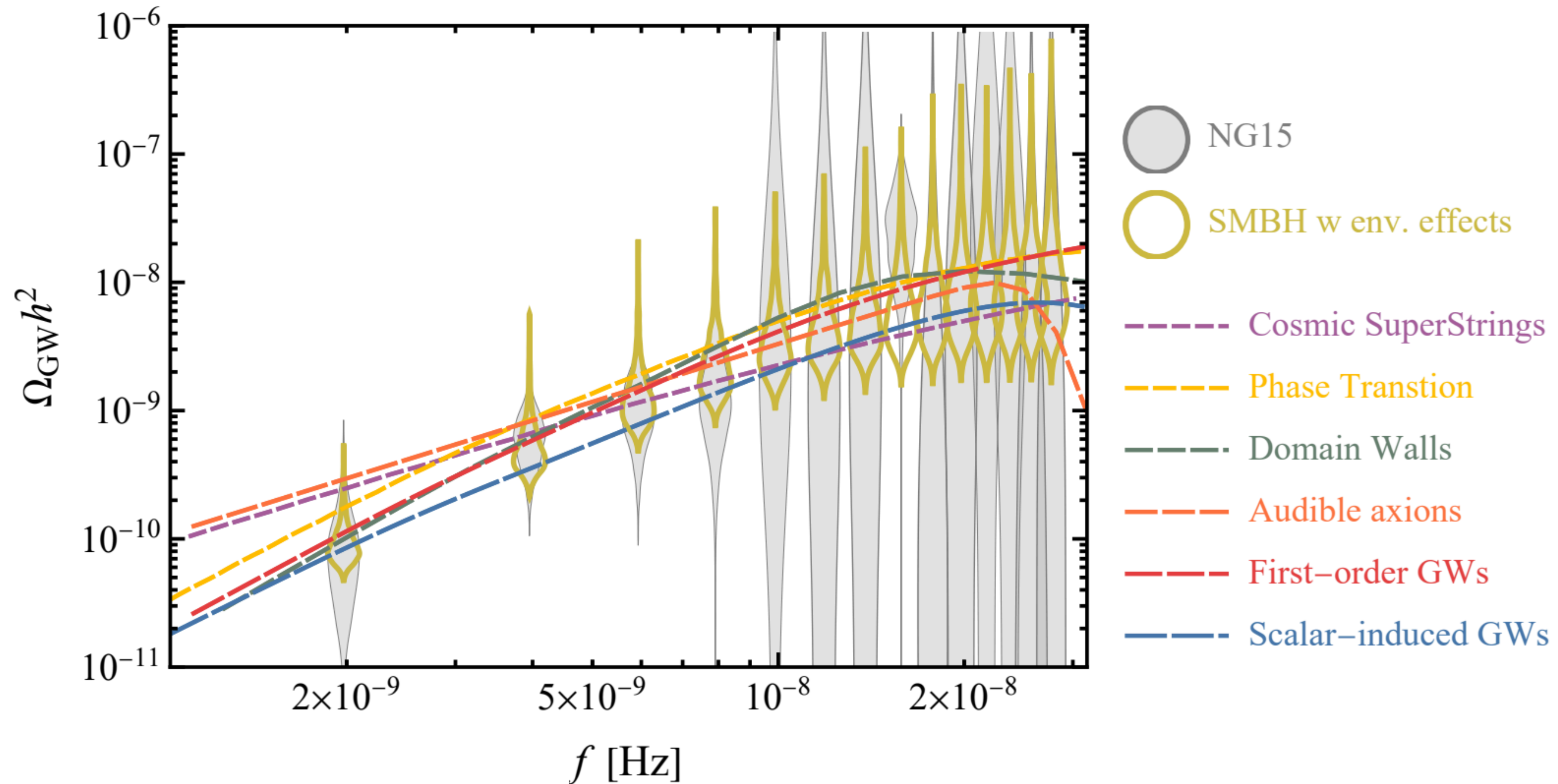
- None perturbative effects (Cosmic Strings, Domain Walls)
- Phase transitions

-Primordial fluctuations

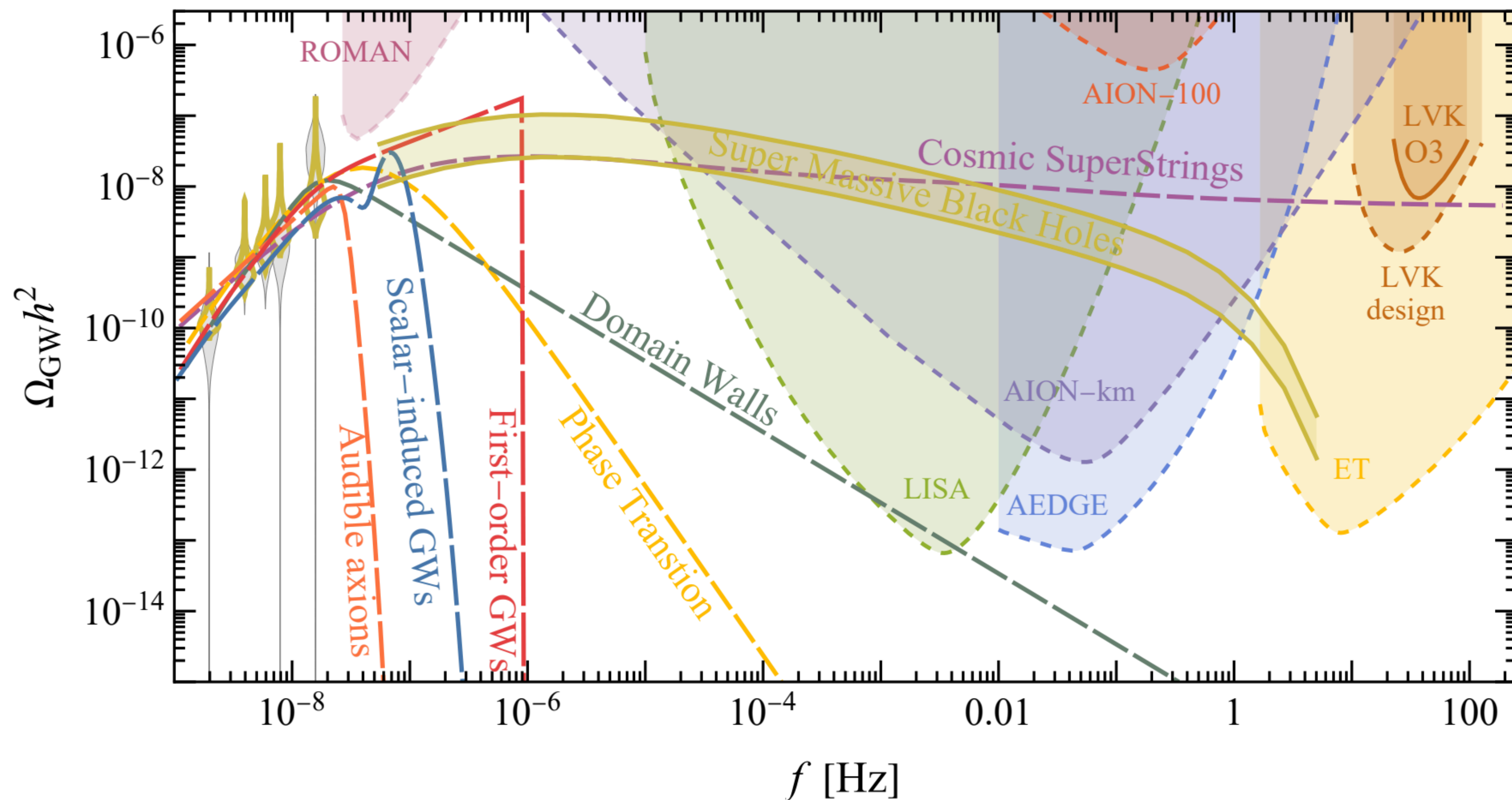
- First order
- Scalar induced



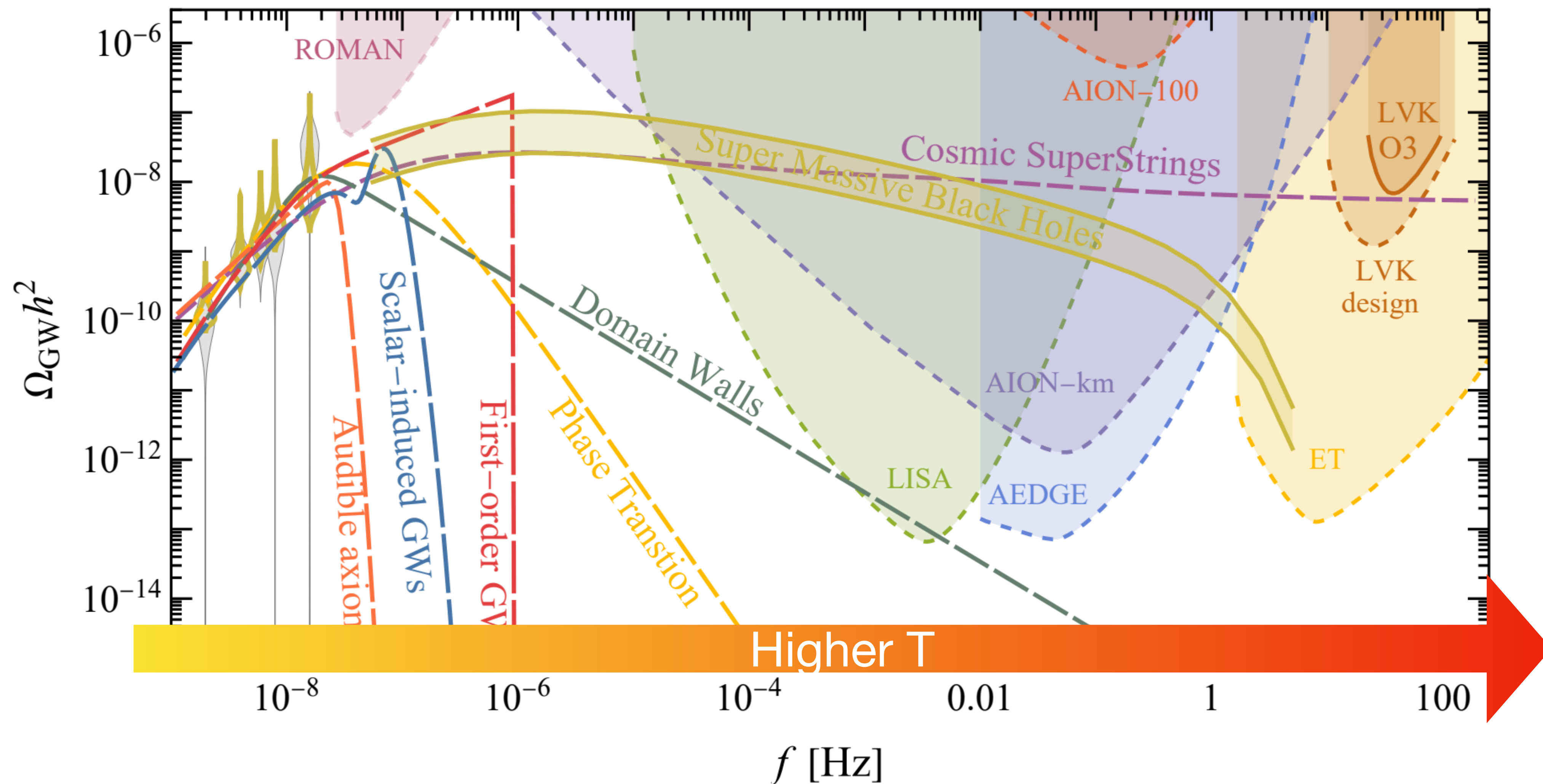
Many cosmological interpretations can fit the data



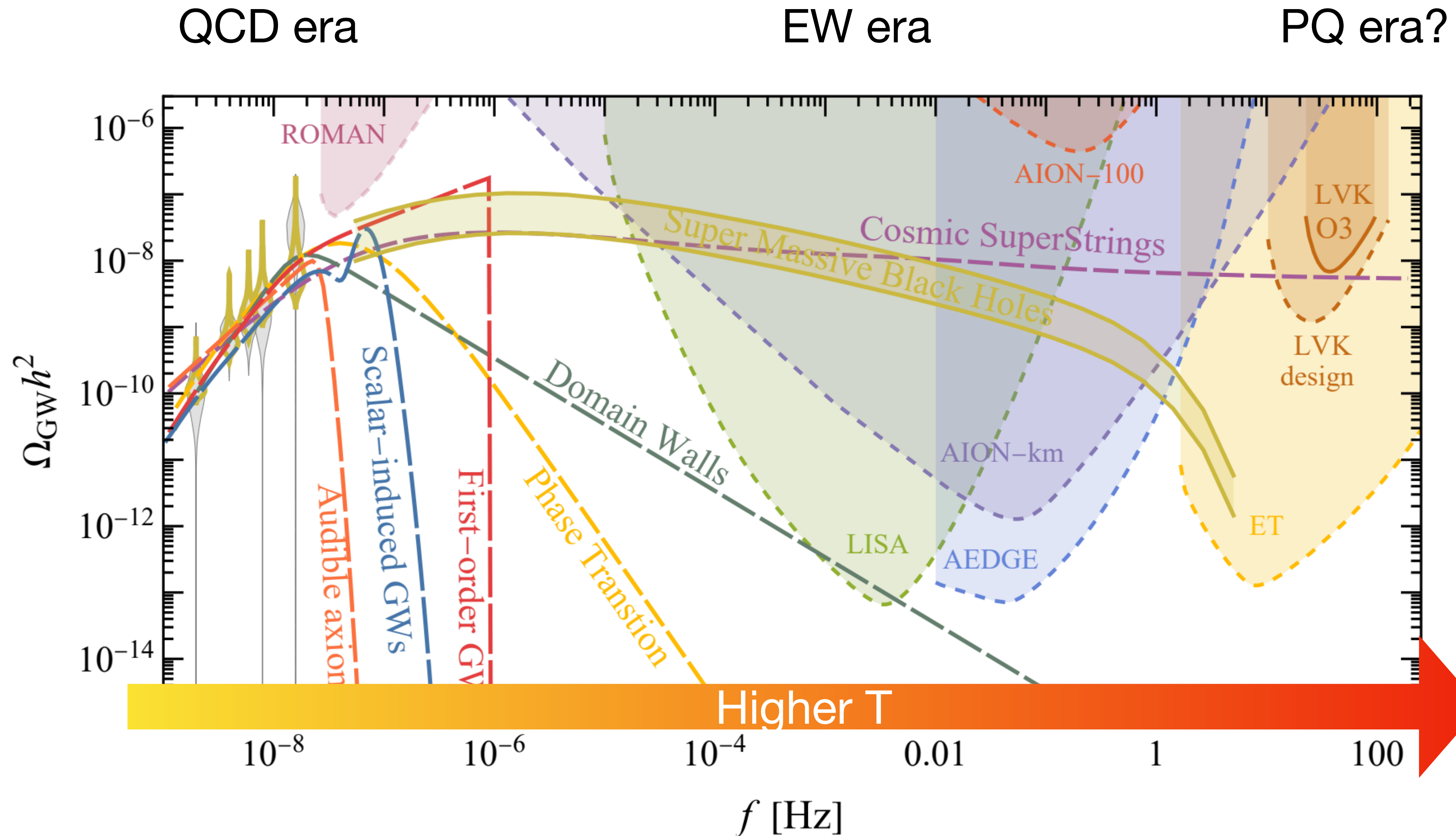
Different predictions for higher frequency detectors



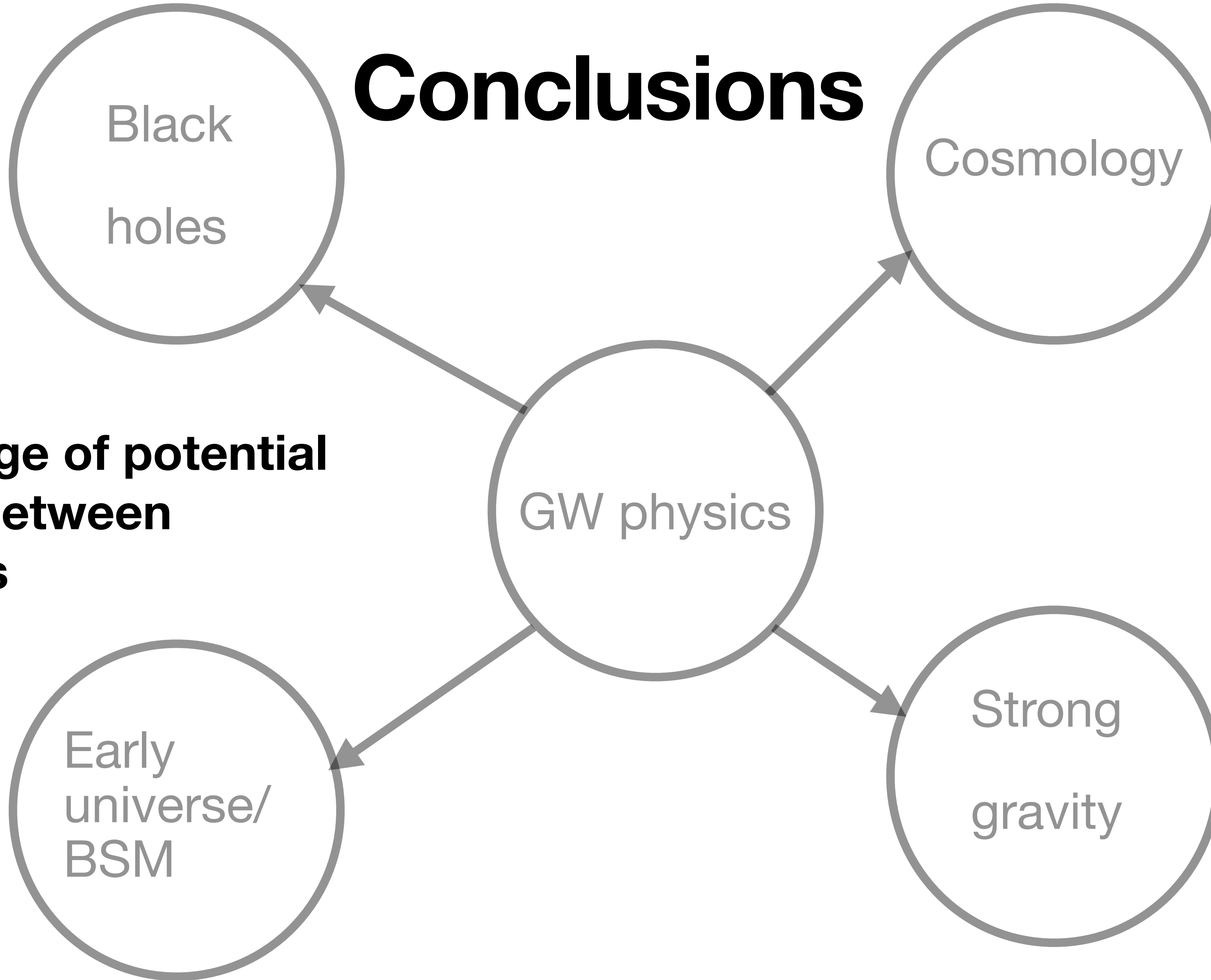
Symmetry breaking in the early universe



Symmetry breaking in the early universe



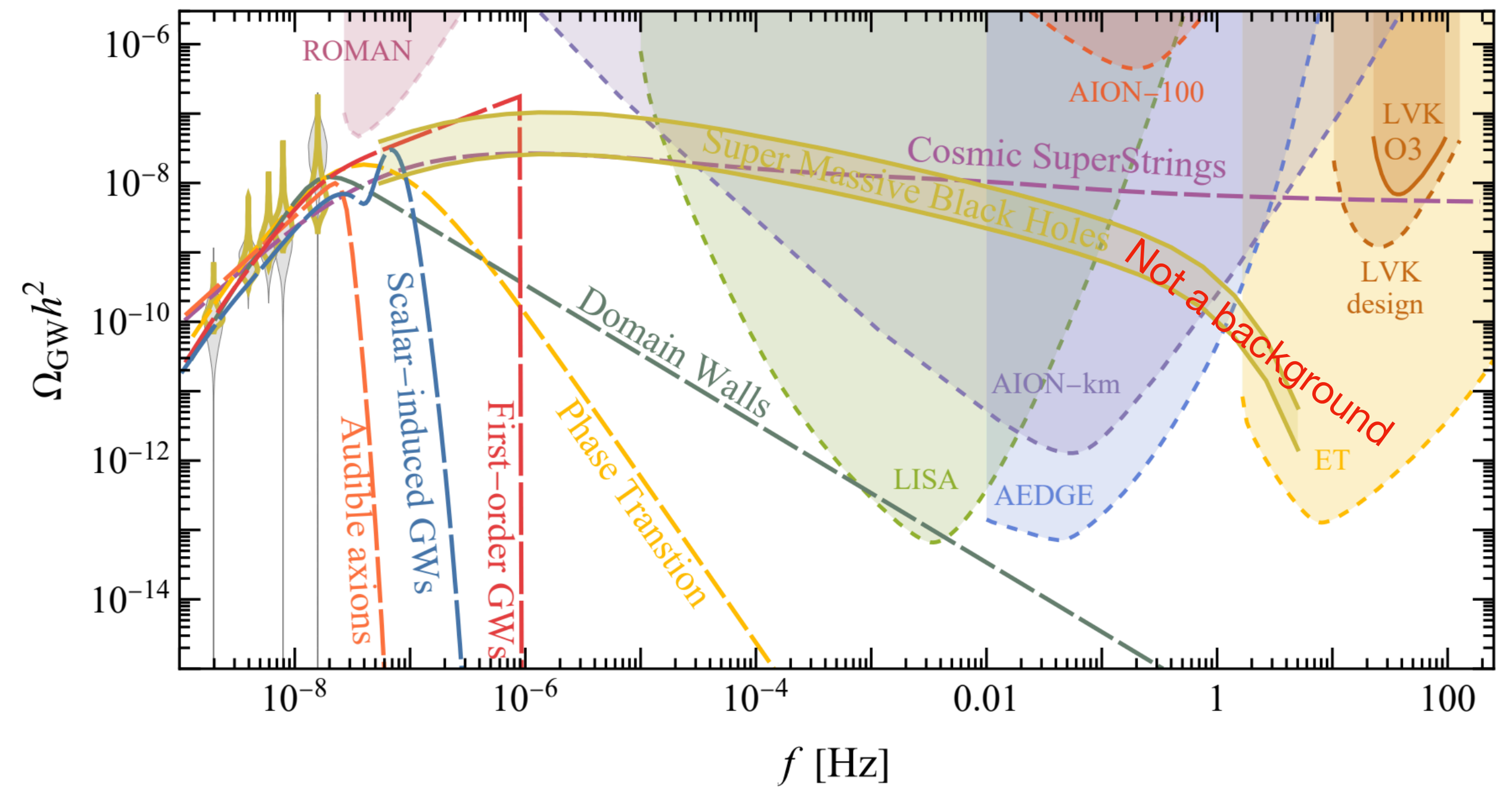
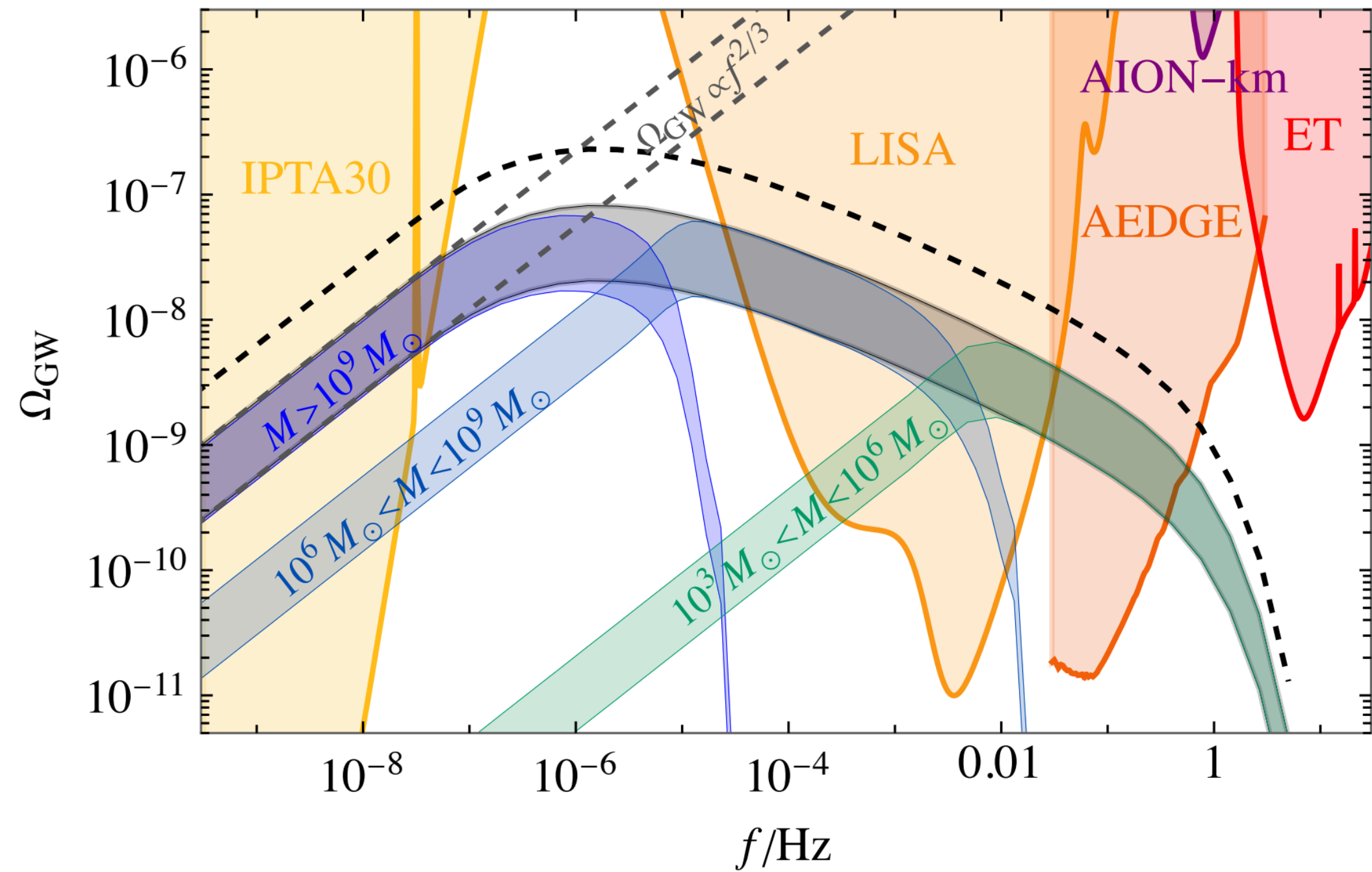
Conclusions



Wide range of potential overlap between detectors

Conclusions

NANOgrav+JWST observations are guiding the predictions for atom interferometers



Exciting future ahead of us!