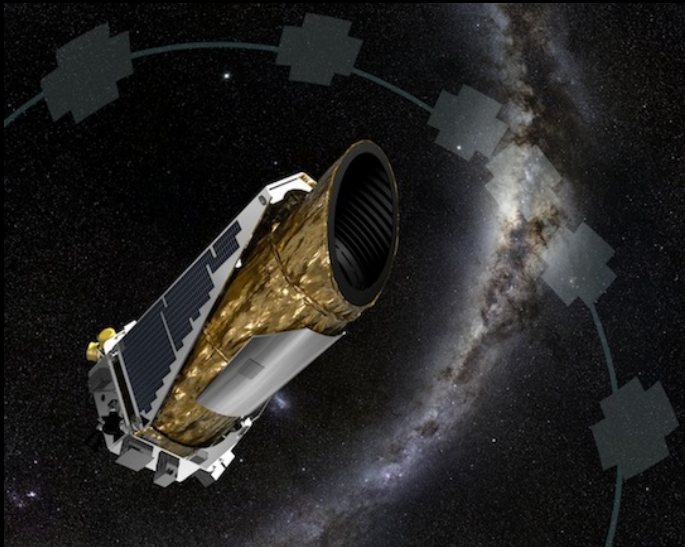


What can Kepler and
K2 teach us about...



...Other
Galaxies?



Krista Lynne Smith
Stanford University / SLAC

Kepler/K2 Special Session AAS 233

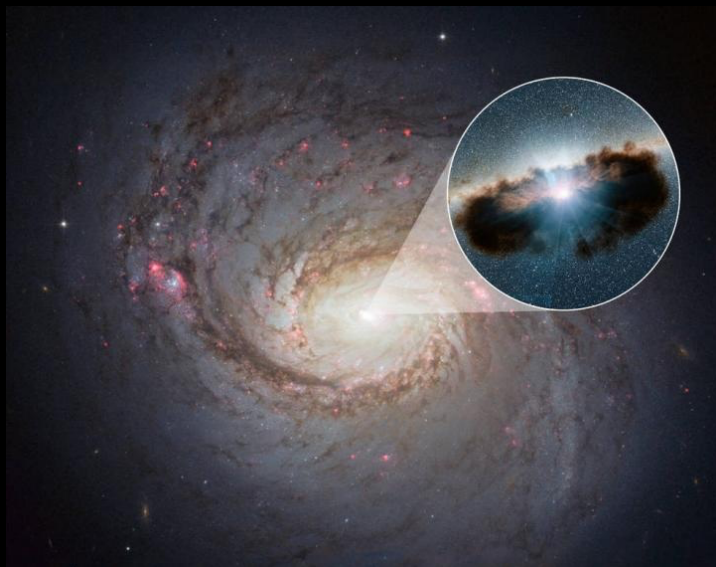
What can Kepler and
K2 teach us about...

...strong
gravity?

...high energy
astrophysics?

...relativity?

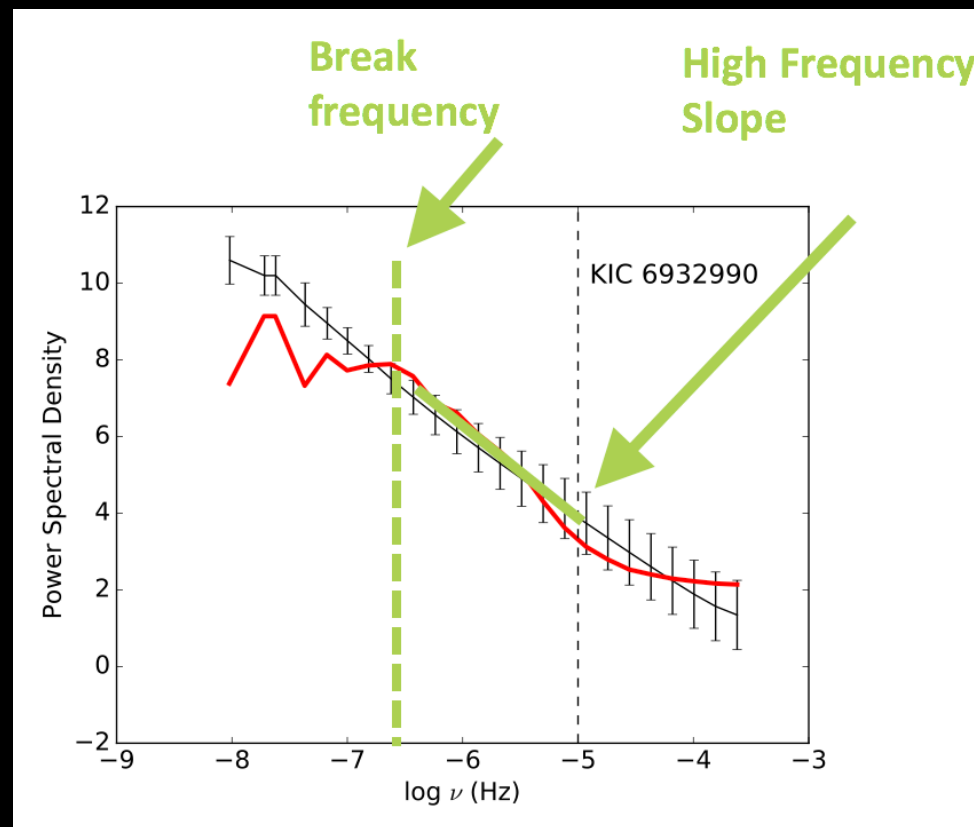
Active Galactic Nuclei



Variability is a unique probe of accretion disks around supermassive black holes.

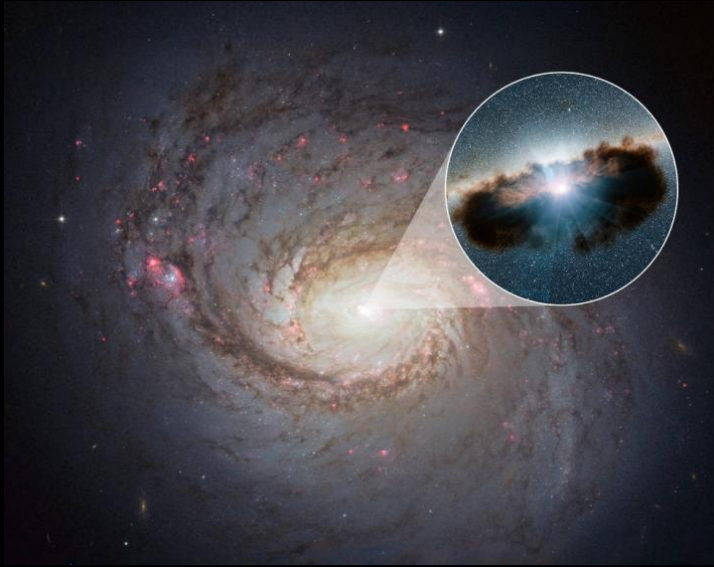
Steeper slopes than ground-based: **different variability drivers in the accretion disk.**

Characteristic timescales that scale with black hole mass: a **possible black hole mass probe?**



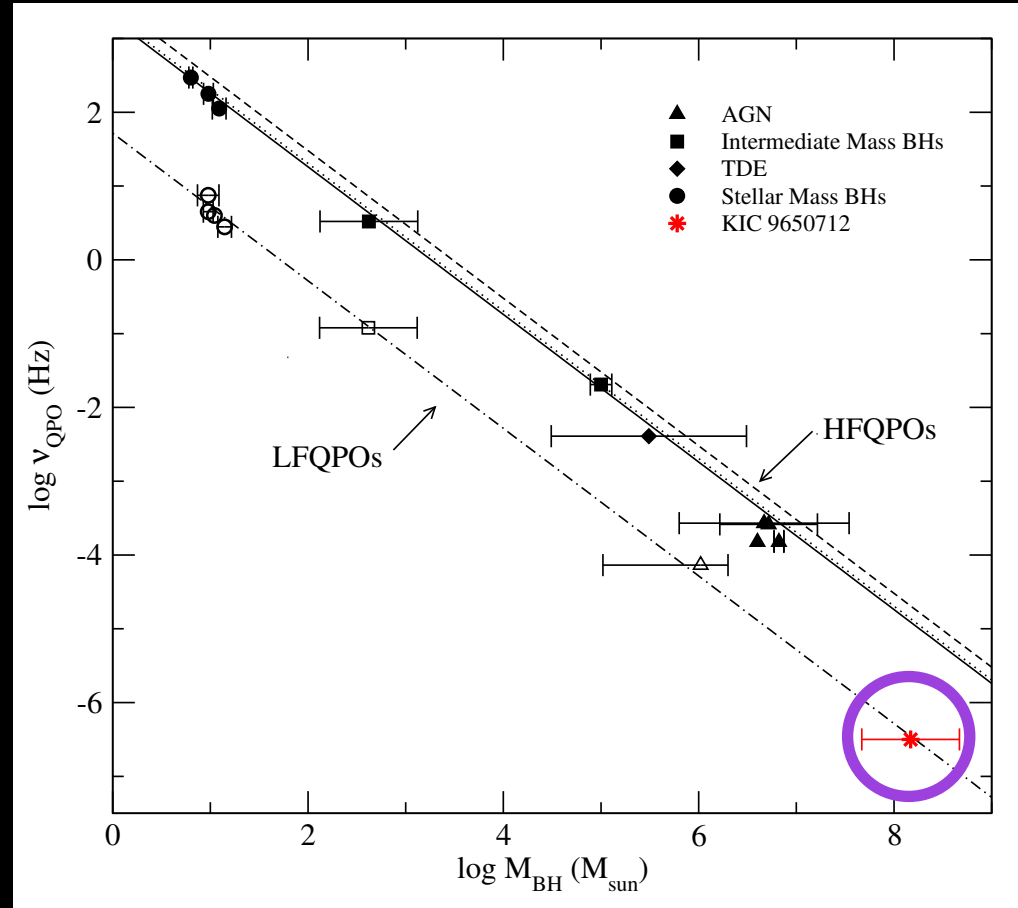
Mushotzky+ 2011, Wehrle+ 2013, Edelson+ 2014, Kasliwal+ 2015, Smith+ 2018a

Active Galactic Nuclei



Quasi-periodic oscillations:
sensitive probes of strong
gravity within a few
gravitational radii (\sim few AU) of
the black hole.

Accreting central supermassive black holes occurring
in $\sim 10\%$ of galaxies



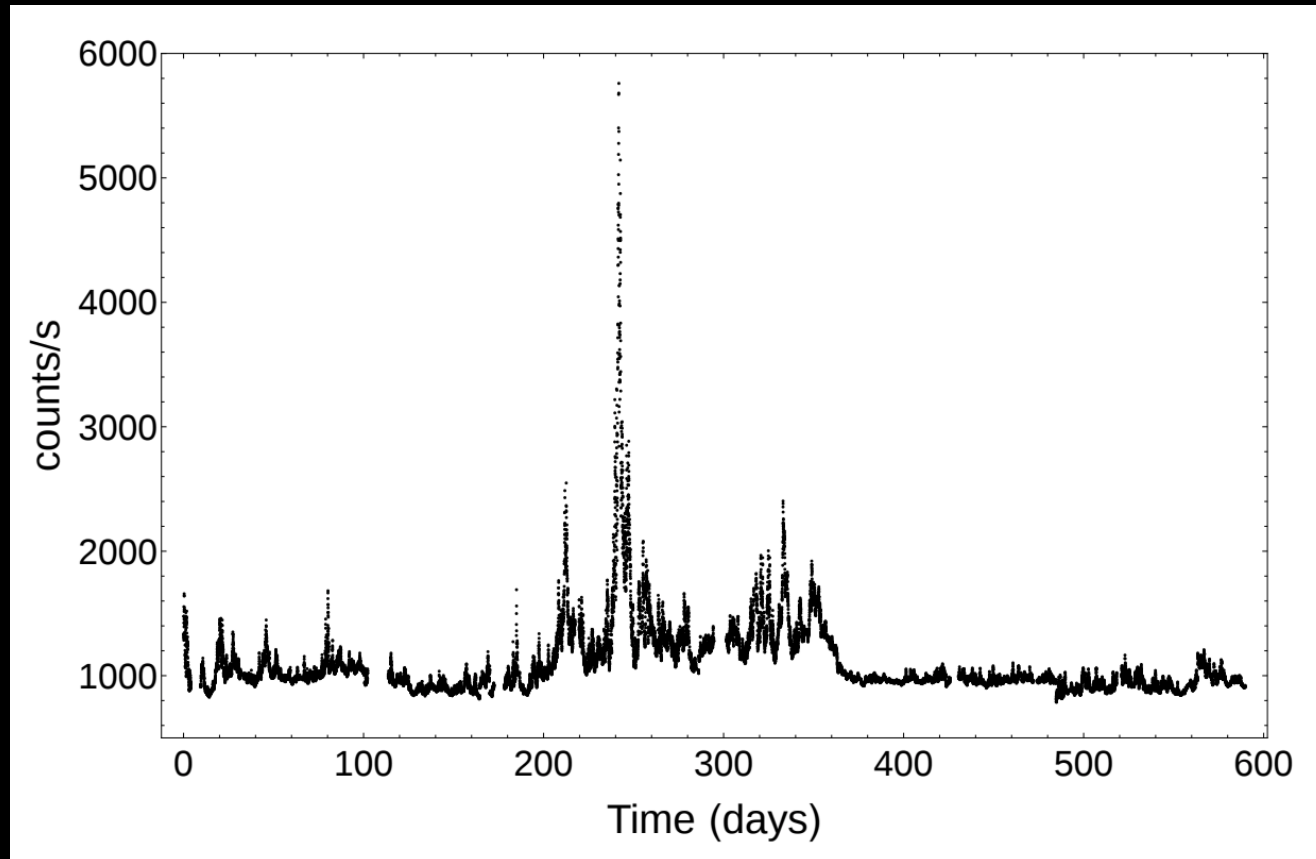
Smith et al. (2018b)

Blazars



An AGN in which the optical emission (and variability) comes from the relativistic jet.

The Kepler Blazar W2R 1926+42



-Oscillations consistent with orbital features in helical jet

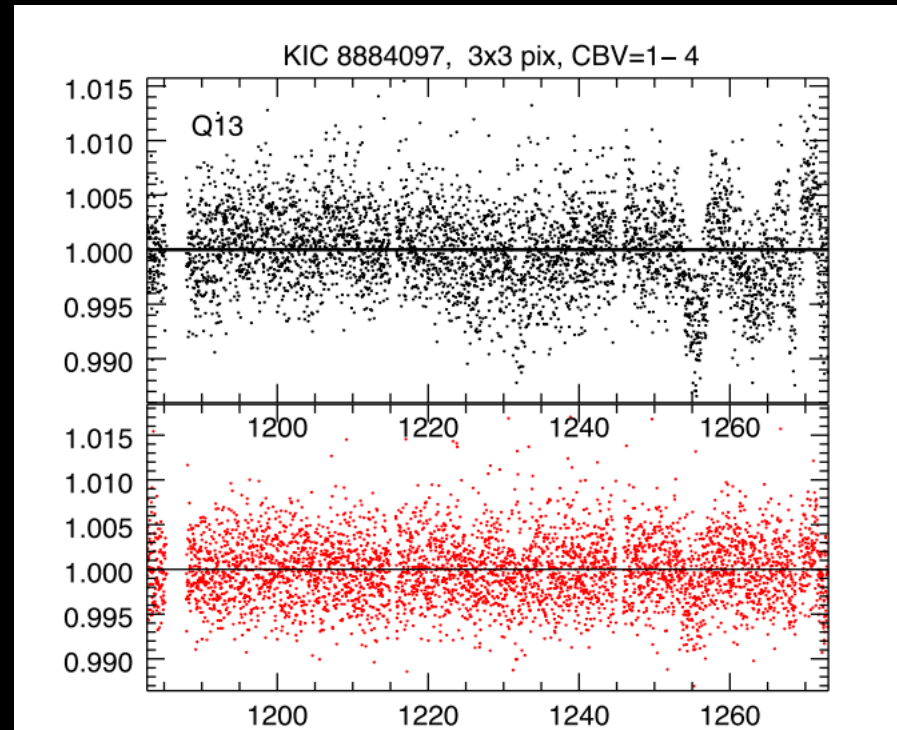
-Flare asymmetries indicating possible acceleration / dissipation timescales

New ways to detect weak or small AGN



Kepler / K2 precision allows detection of AGN at $10^{-3} L / L_{\text{Edd}}$, a **very low accretion rate**.

In the future, this may allow detection of accreting intermediate mass black holes in dwarfs – **possible seeds of supermassive black holes**.



Shaya et al. (2015)

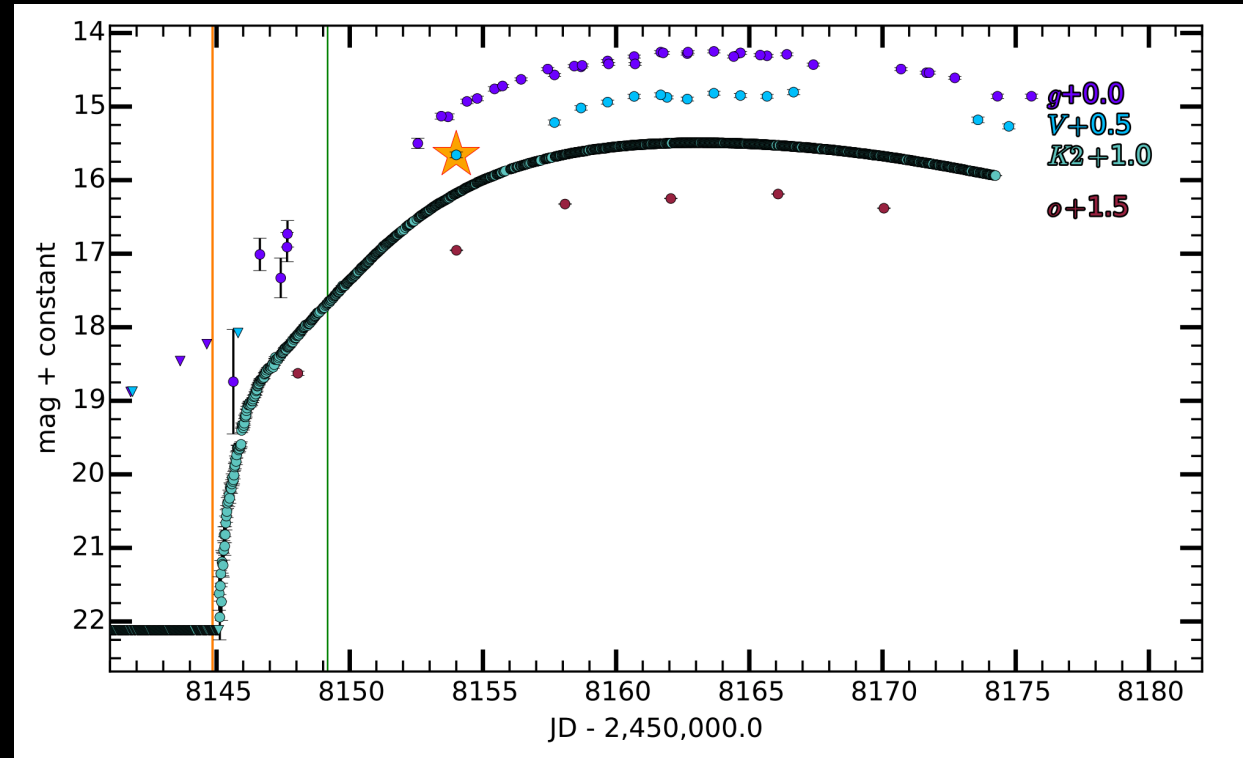
Supernovae



Two-component rise has information on companion, progenitor, acceleration mechanisms...

Could dispel degeneracies affecting cosmological distance measurements.

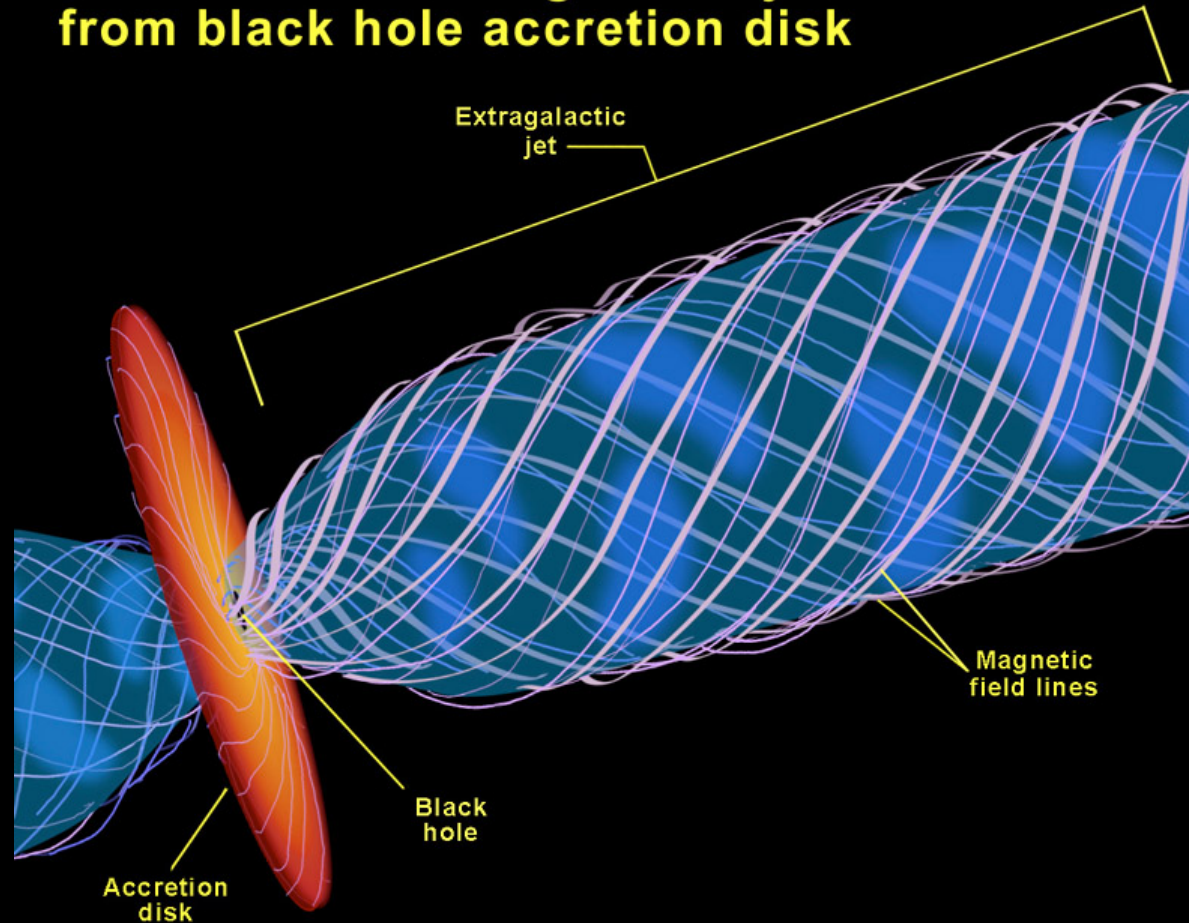
Powerful explosions at the deaths of massive stars, also really important cosmic distance indicators.



Shappee et al. (2018)
(also Dimitriadis et al. 2018, Garnavich et al. 2016,
Olling et al. 2015...)

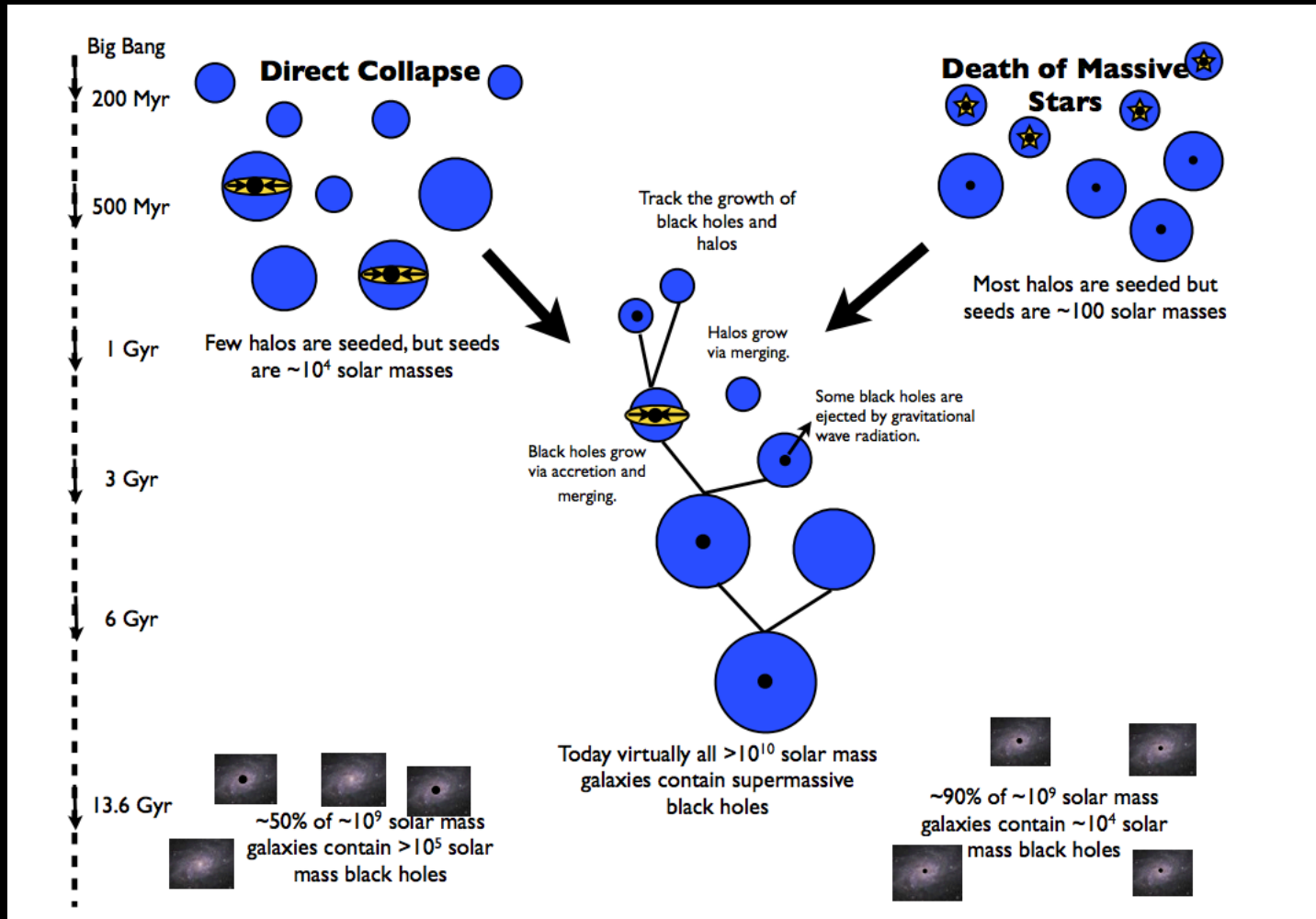
Larger questions!

Formation of extragalactic jets from black hole accretion disk



Do objects with jets have different types of disks?

Larger questions!



What is the occupation fraction of black holes in small galaxies, and what does that mean for primordial seeds?

Thank you!