Disks, black holes & gravitational waves

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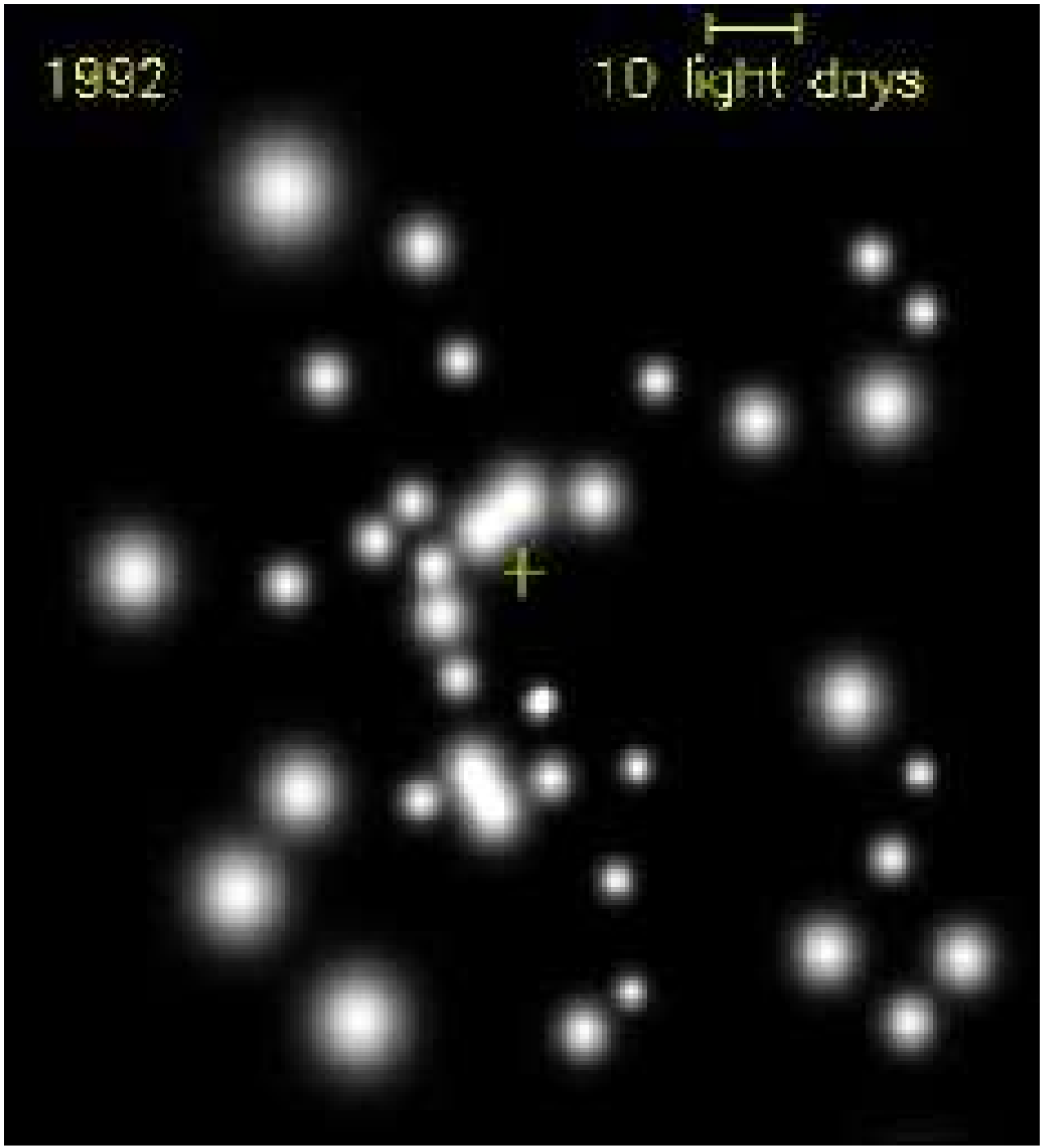
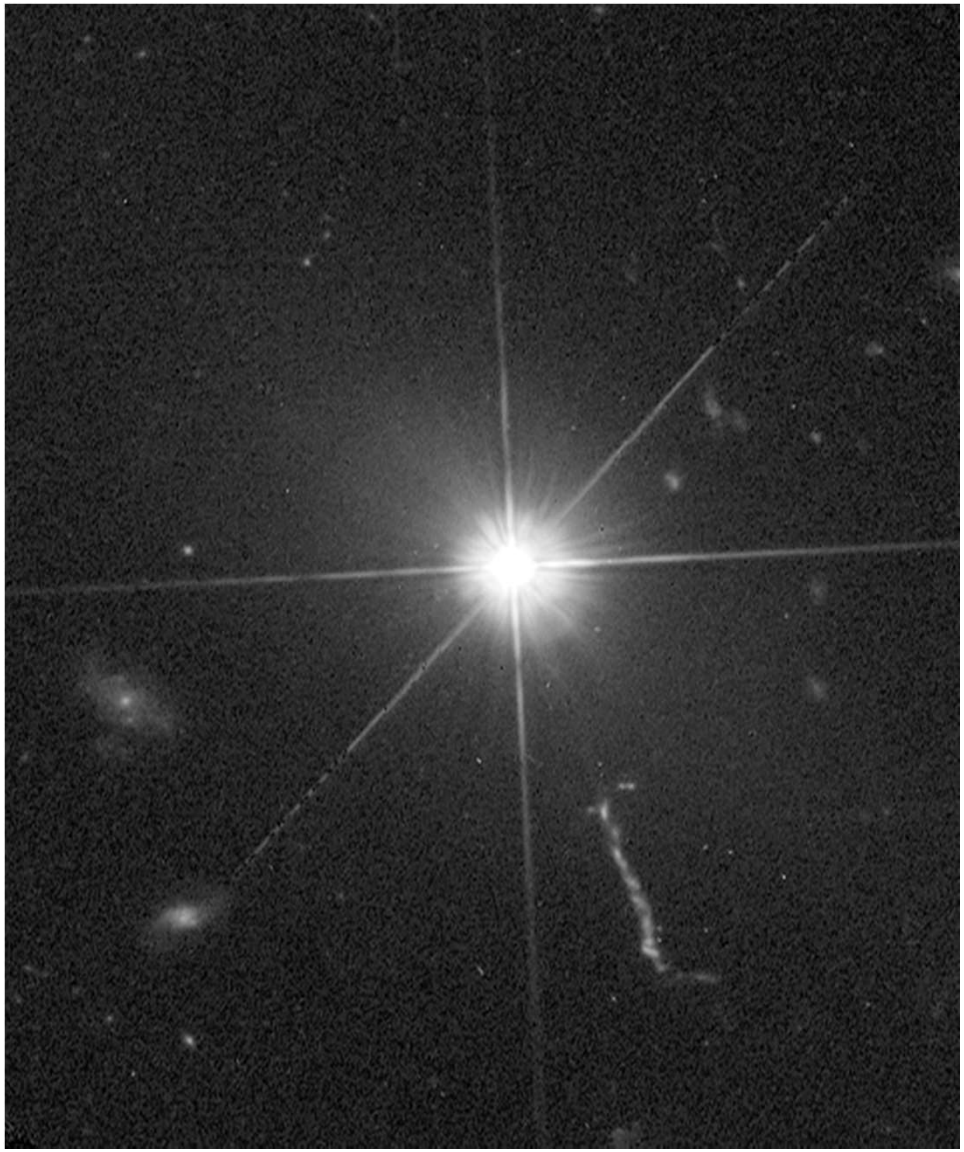
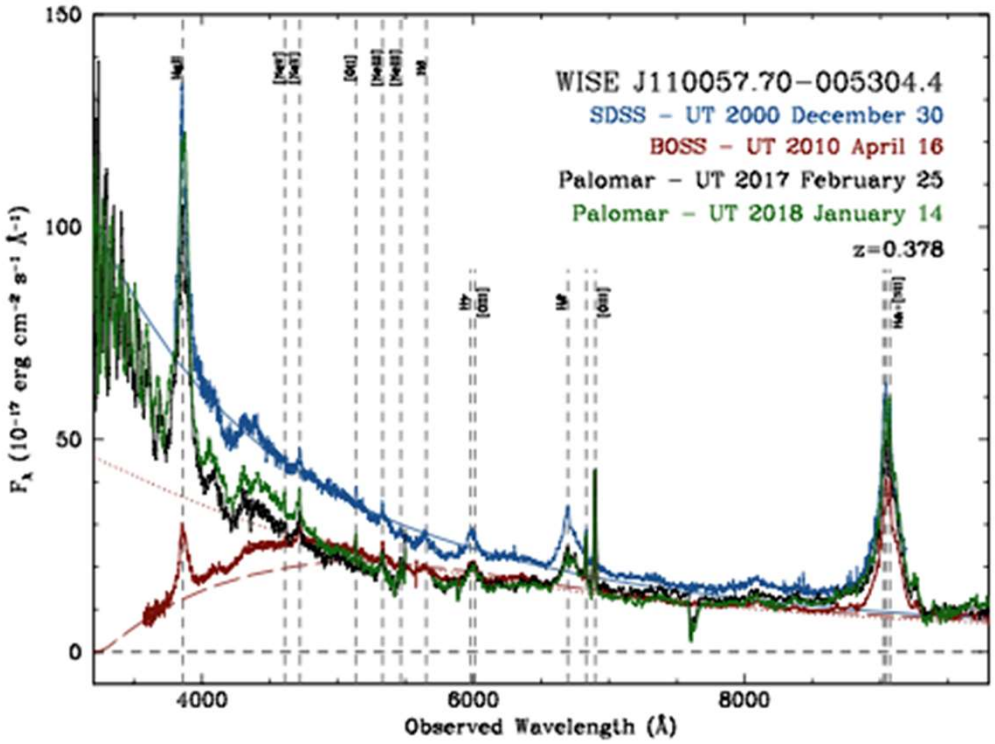
NYC: CUNY(Ford, Bellovary, O'Dowd, Minor), AMNH (Mac Low, Leigh, Shara), Columbia (Haiman)

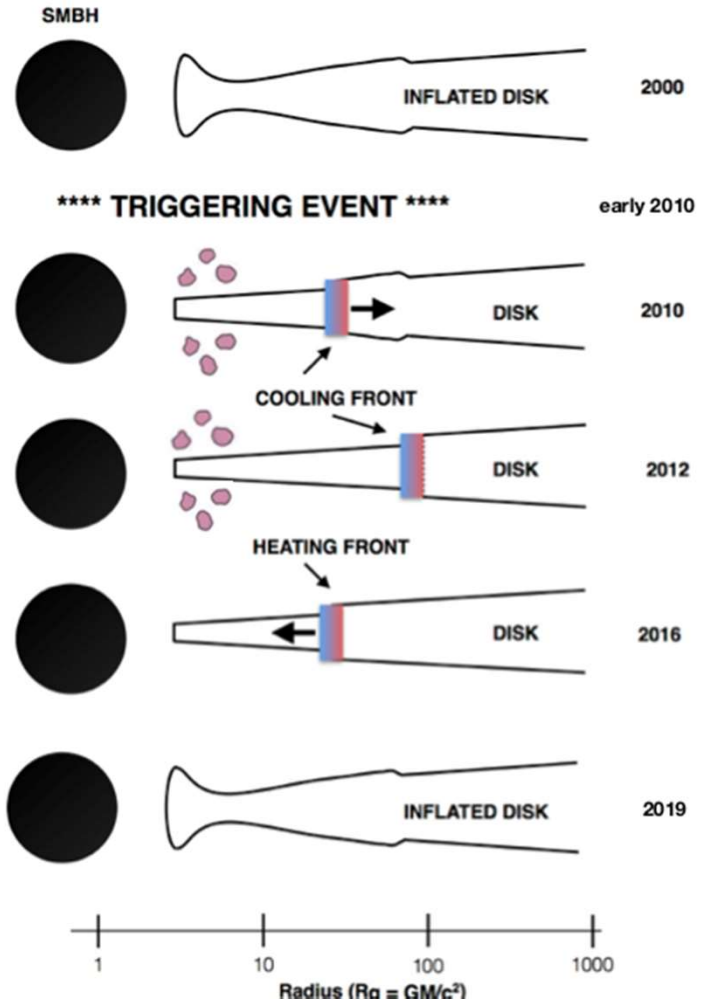
CalTech/JPL(Graham,Stern), STScI (Sivaramakrishnan)


1992
10 light days



Rapidly changing disks





Stern+18; Ross+18; Graham+19

Galactic nuclei:

-Lots of stars & dead stars

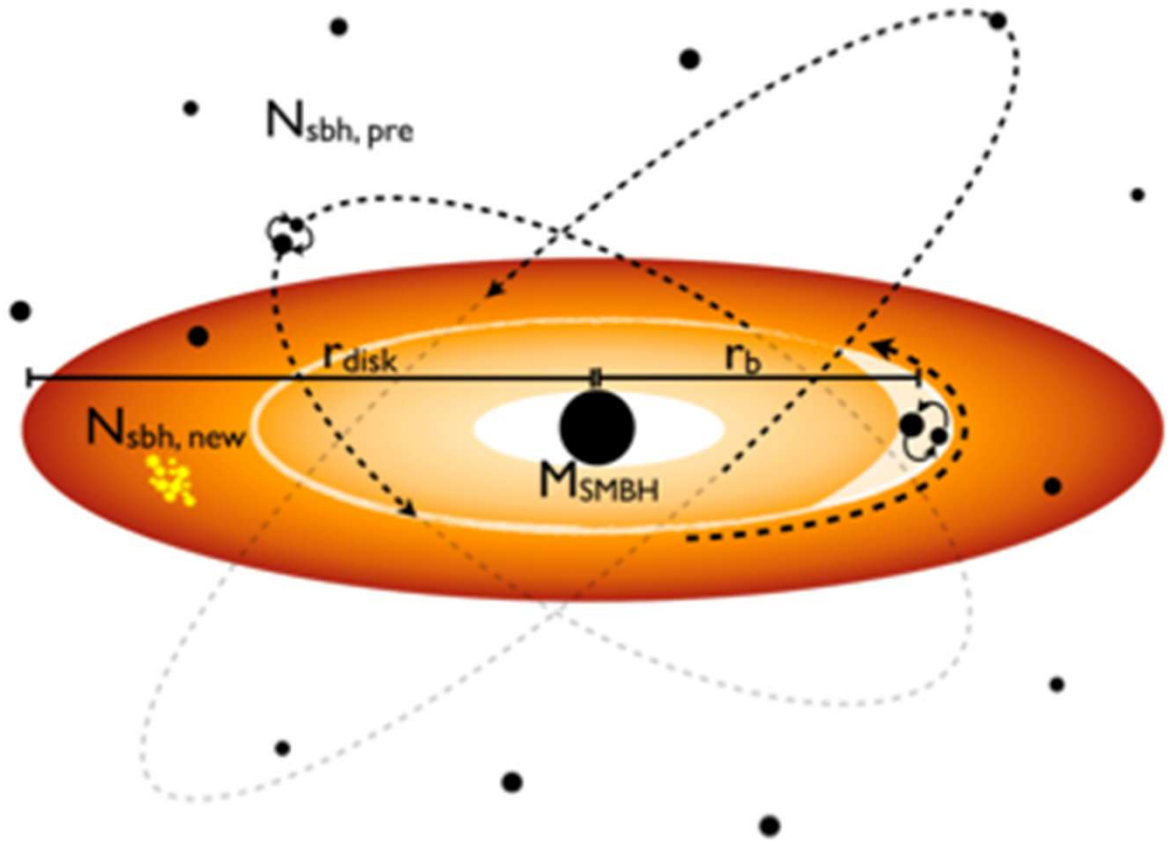
-Densest population of BH in Universe (Hailey+18).

Add AGN gas disk:

-Stars/BH end up in gas disk

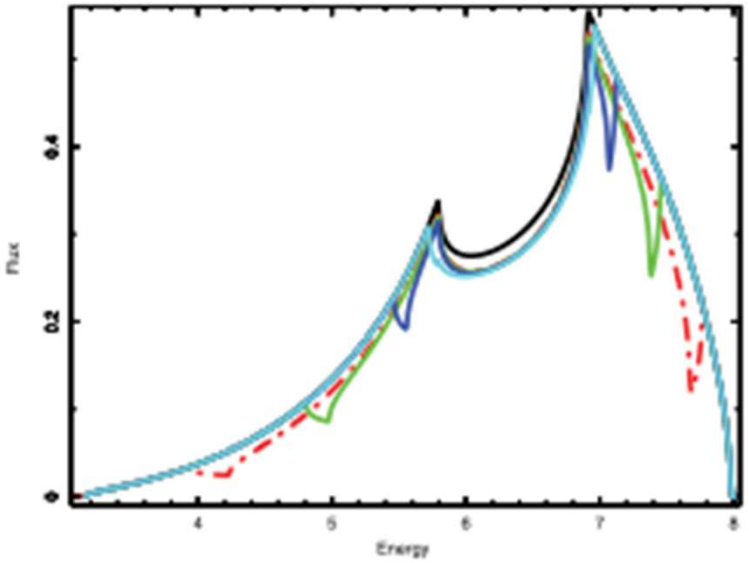
-Migrate/collide & merge

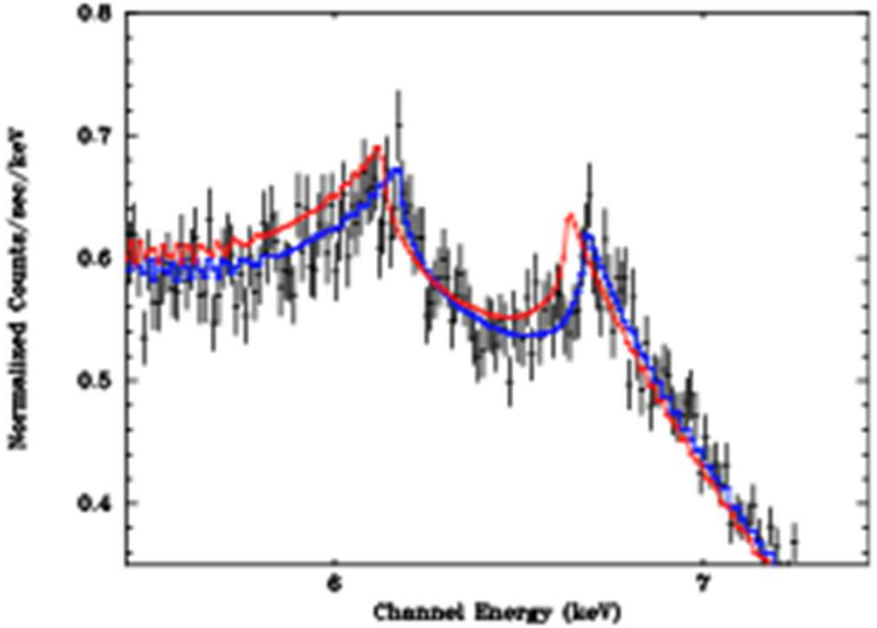
A cartoon AGN



McKernan,Ford+2012,2014=LIGO + LISA prediction
Bellovary+2016; McKernan+2018

Relativistic lines as LIGO/LISA probes

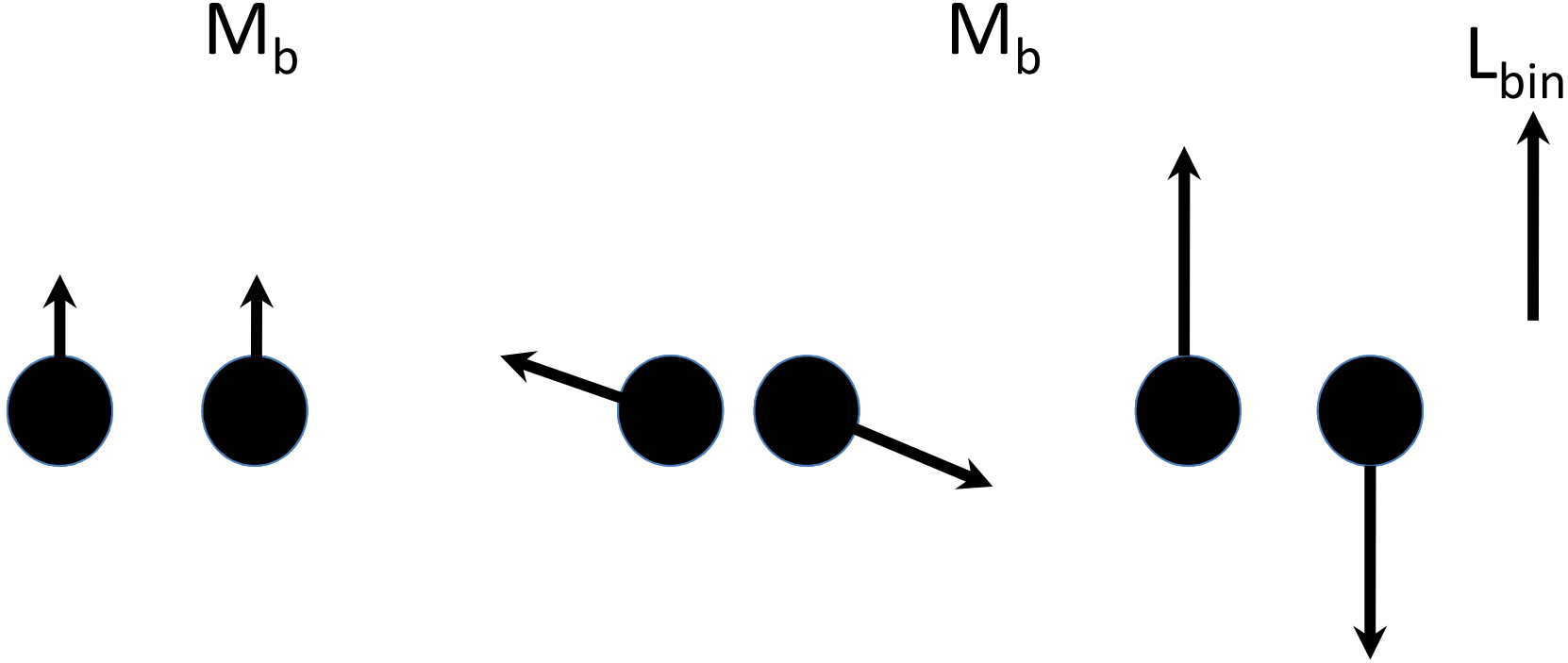




McKernan, Ford, Kocsis & Haiman (2013); McKernan & Ford (2015)

Low χ_{eff} :≠ low spin

$$X_{eff} = \frac{M_1}{M_b}|a_1|\cos\Theta_1 + \frac{M_2}{M_b}|a_2|\cos\Theta_2$$



Xeff distribution prediction for LIGO O3 coming v. soon (McKernan & Ford 2018 in prep)