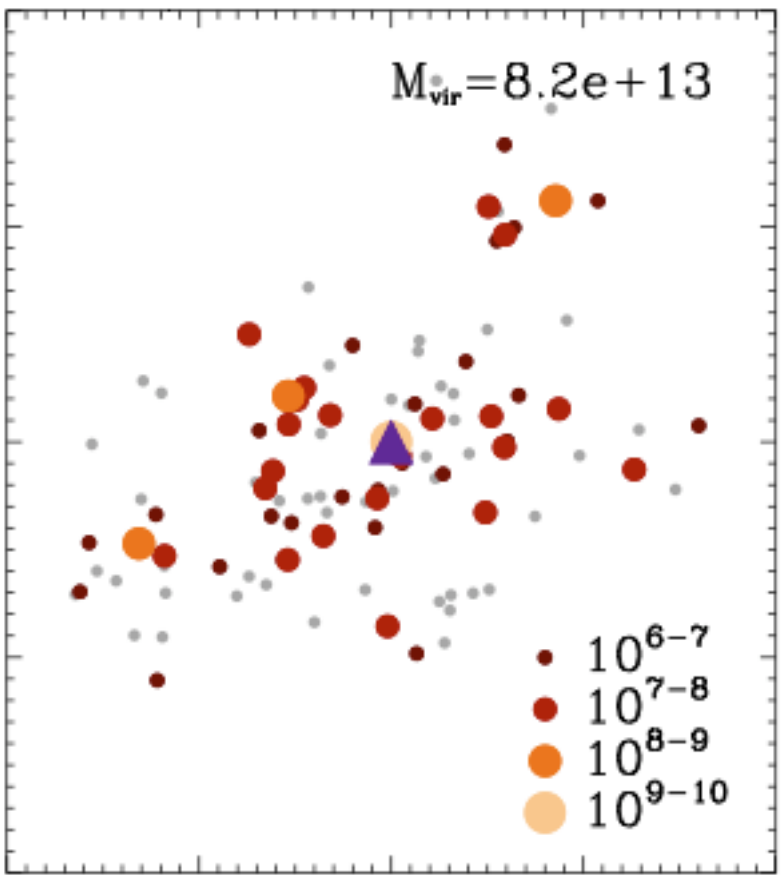
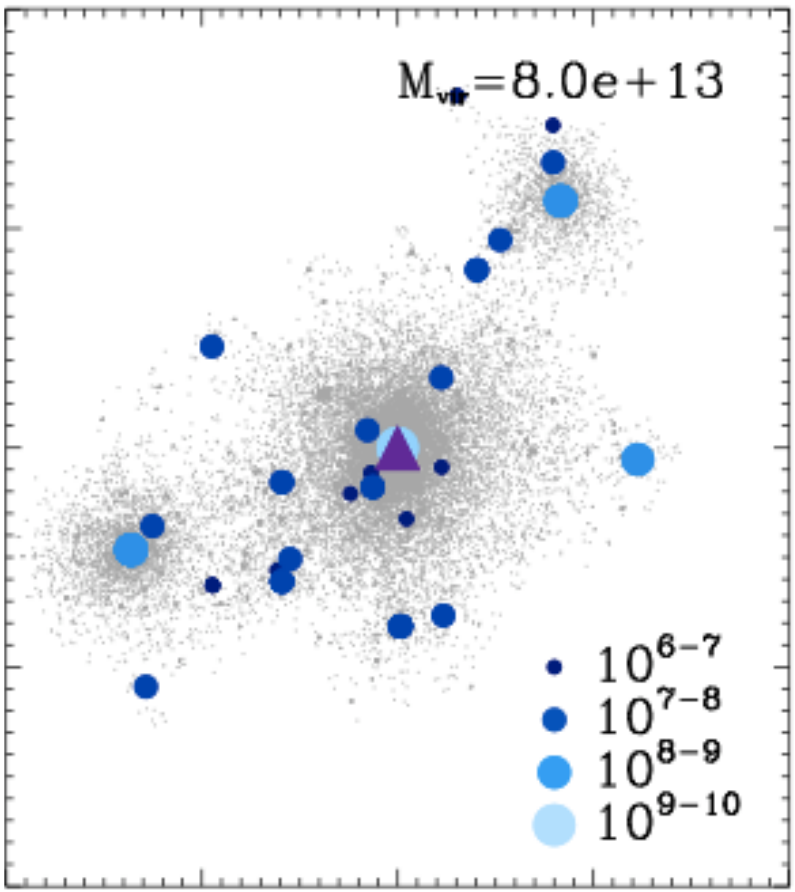
Growing black holes: a comparison between semi-analytic and hydrodynamic simulations



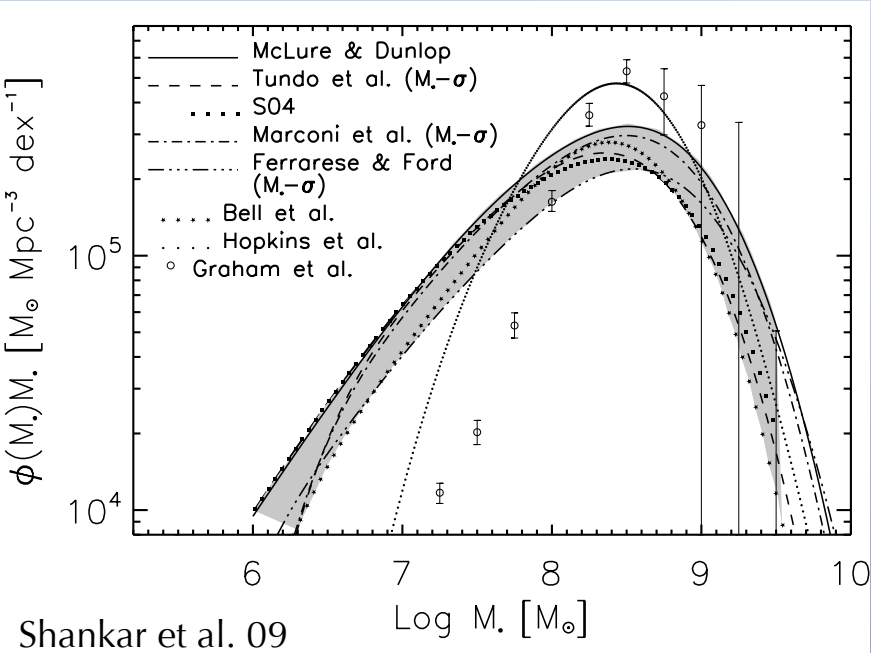


Silvia Bonoli

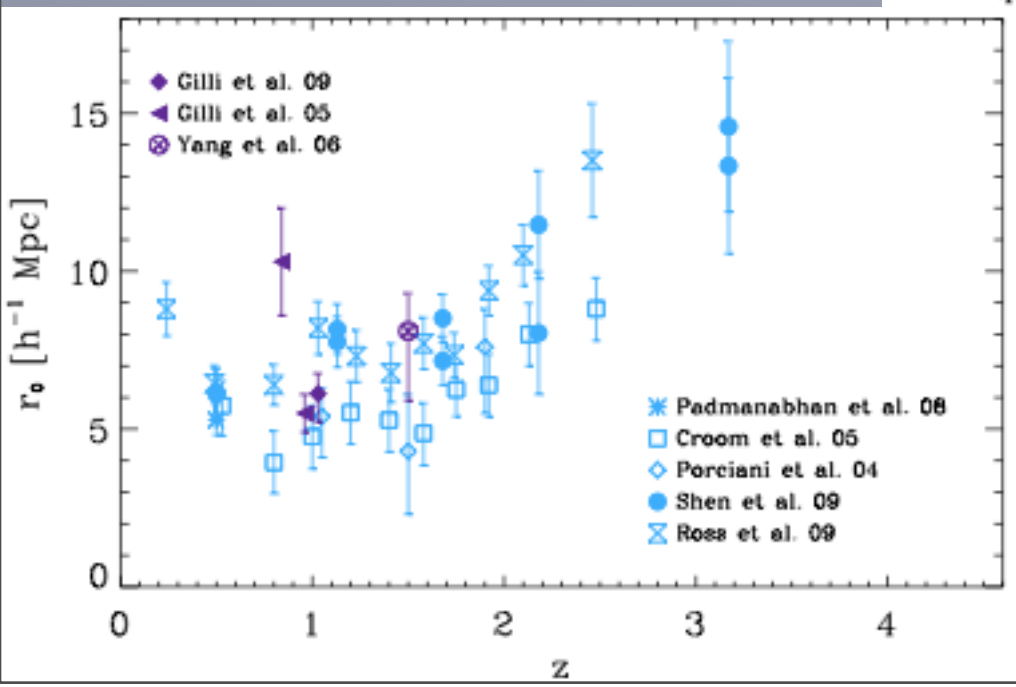
MPA

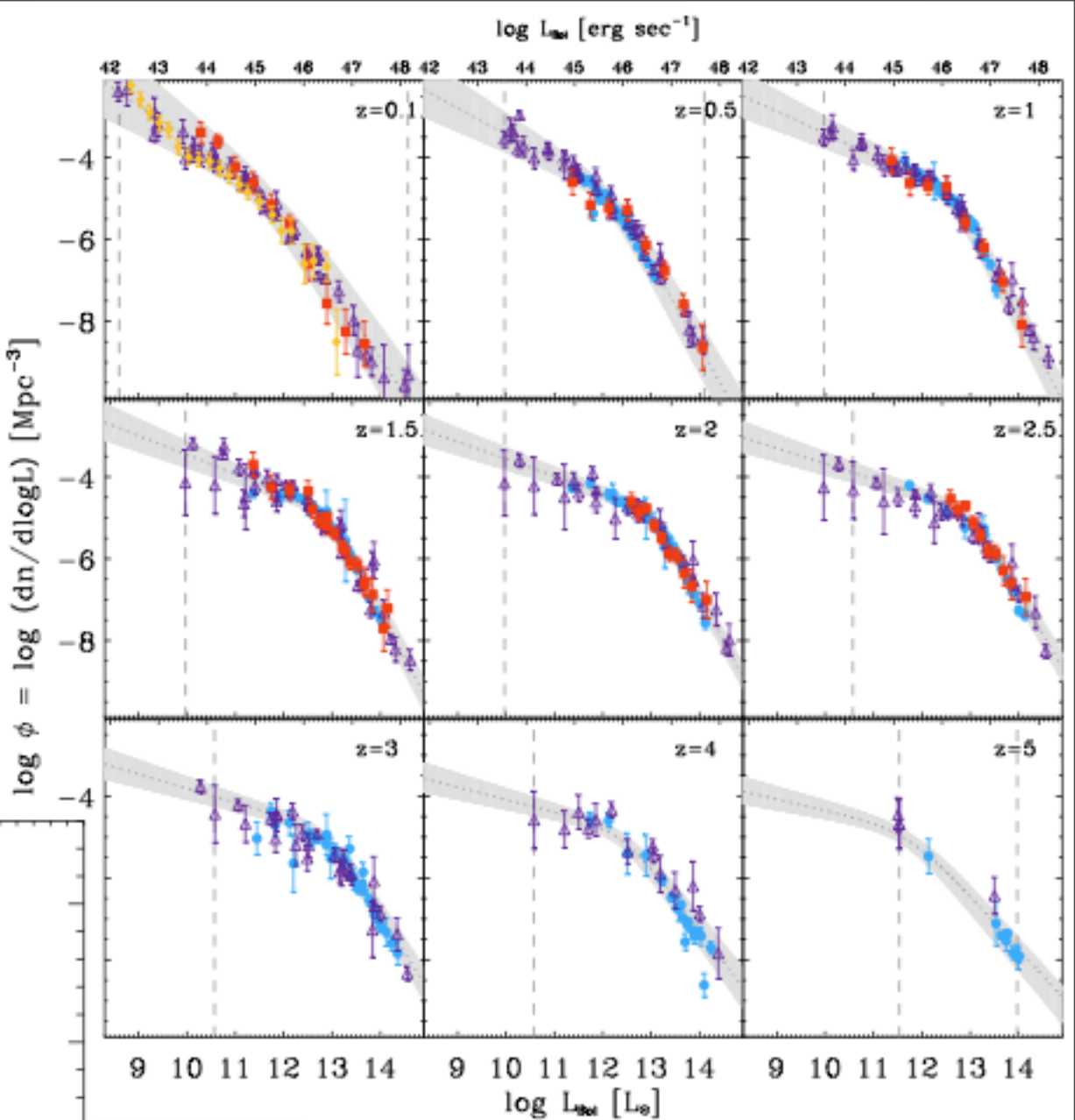
Volker Springel
Simon White
and
Federico Marulli *(University of Bologna)*

Global descriptors



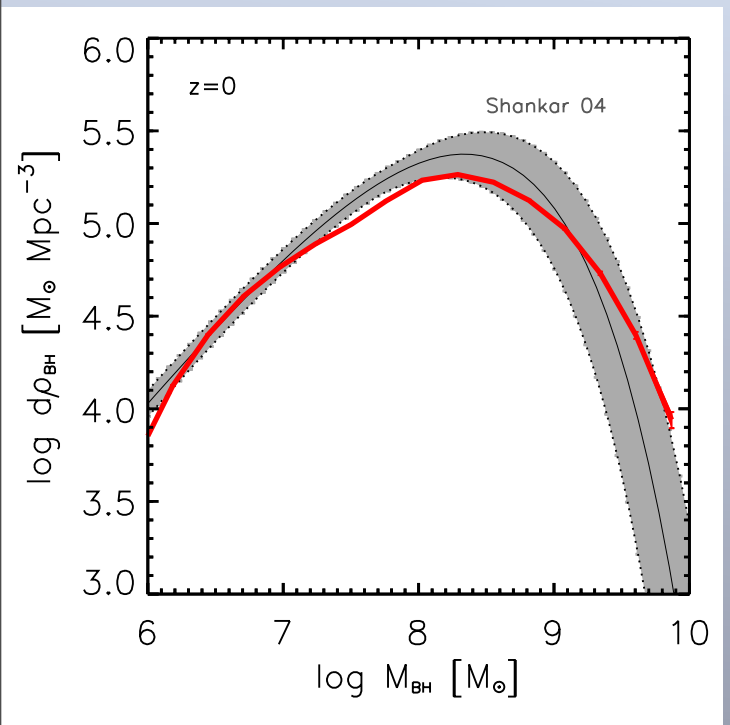
Shankar et al. 09





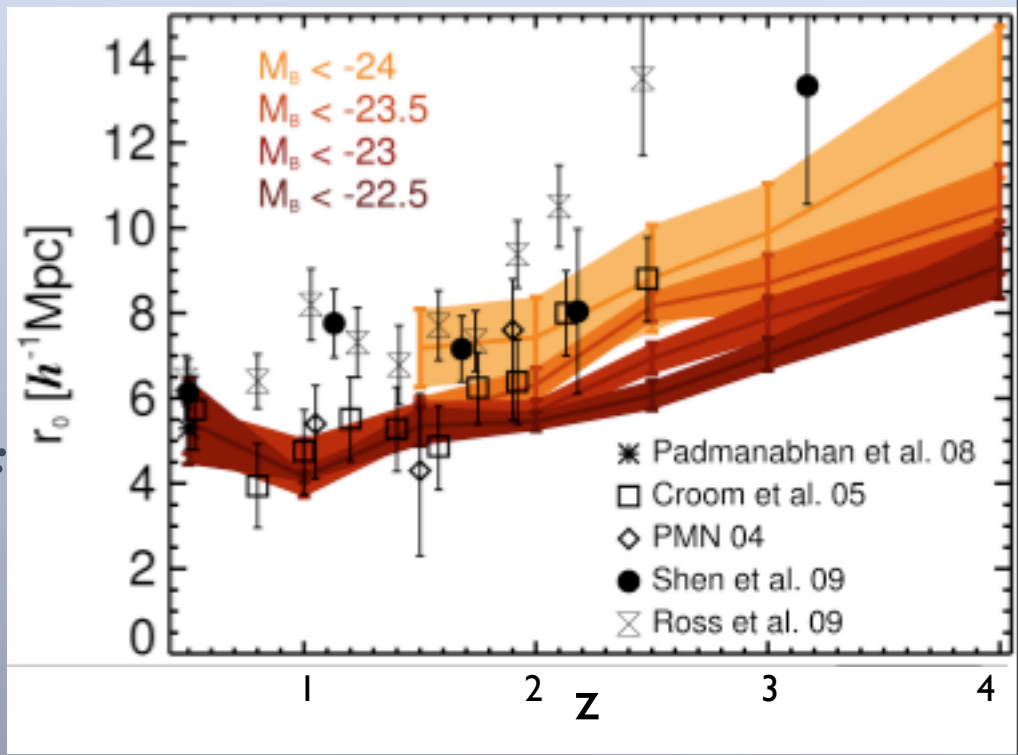
Hopkins et al. 07

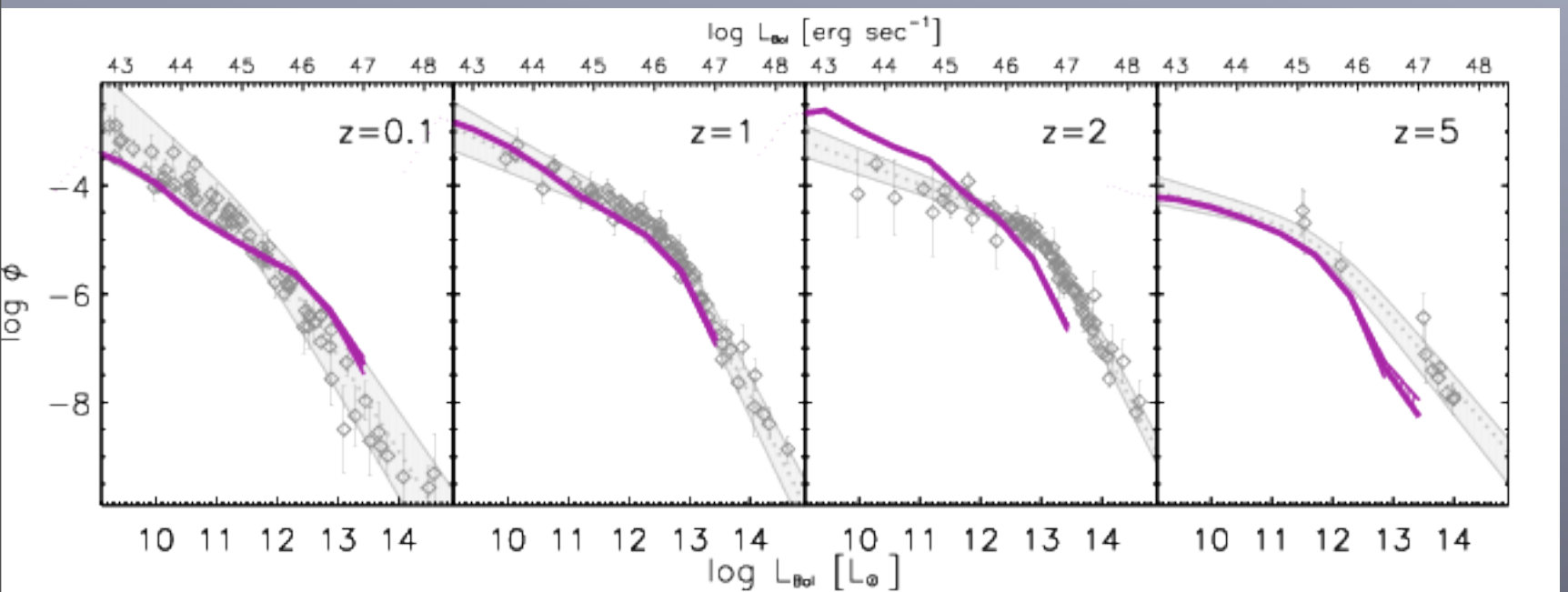
Semi-analytics *(DM simulations + analytic prescriptions)*



Main assumption: primary role of galaxy mergers

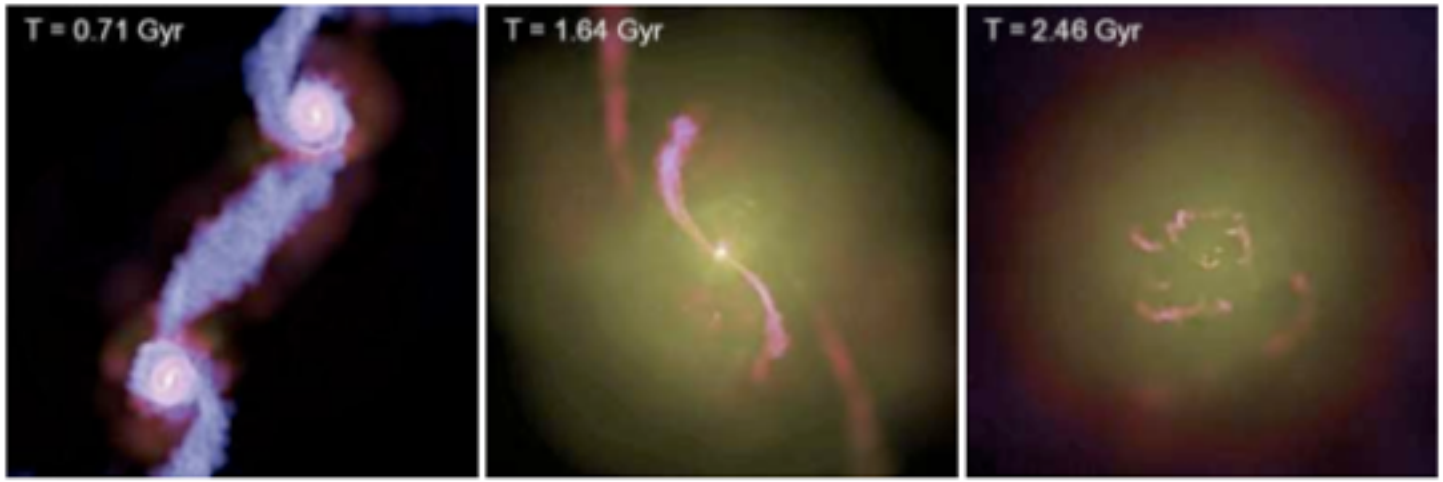
Marulli et al. 2008
Bonoli et al. 2009





hydro-simulations

Bondi accretion model

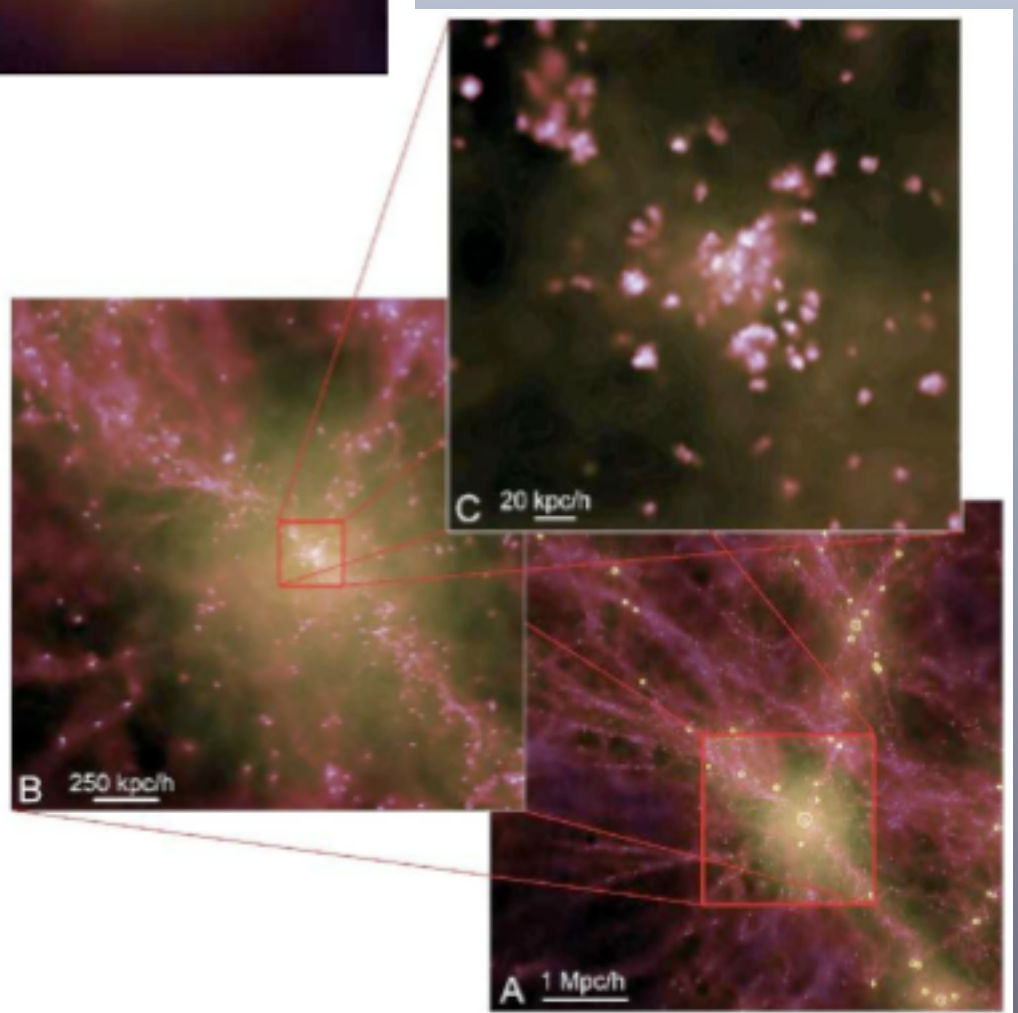


Isolated galaxy mergers

(Di Matteo et al. 05 - Springel et al. 05)

Cosmological simulations

(e.g., Di Matteo et al. 07)



Can these simulations be used to describe the large-scale properties of BHs and Quasars?

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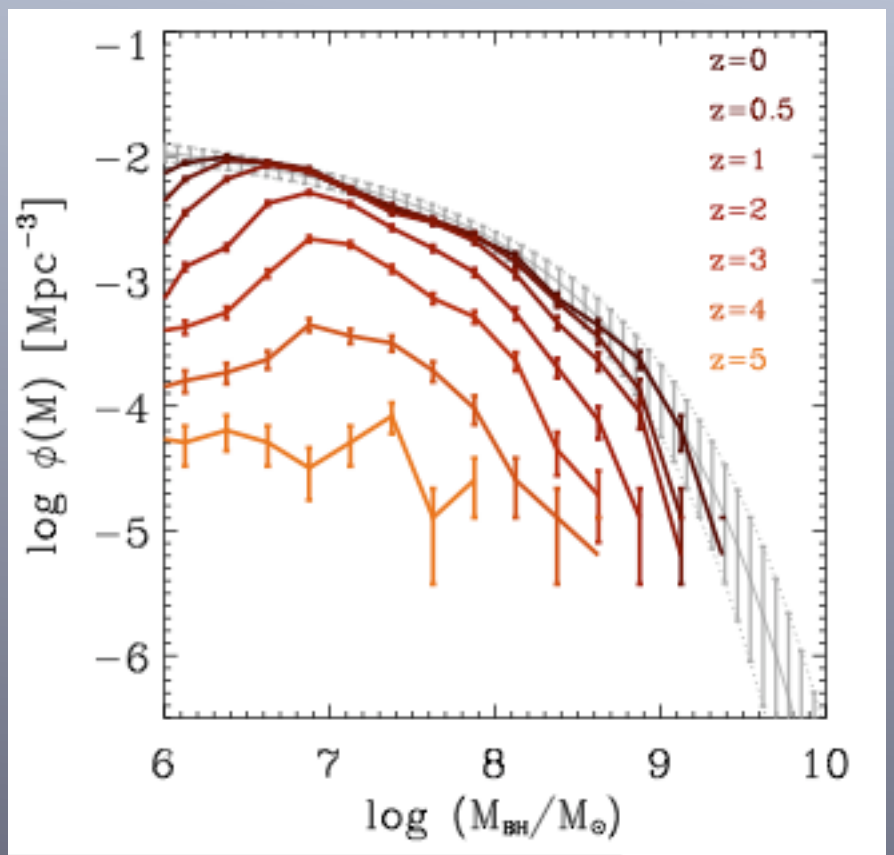
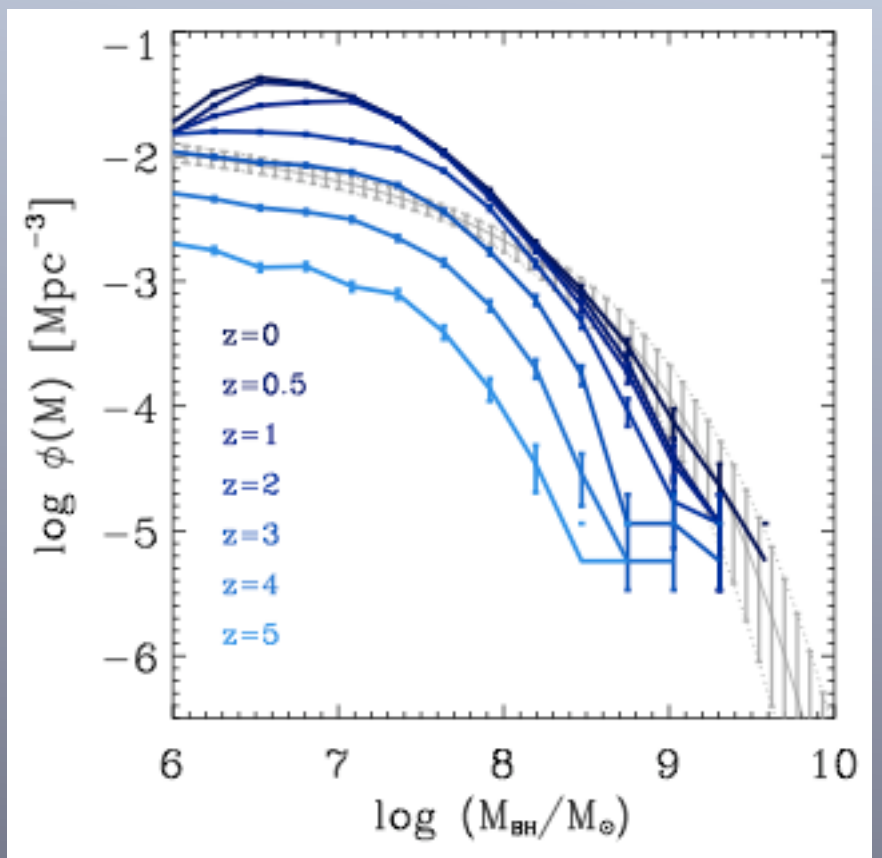
Direct comparison

Same initial conditions
Box: 62.5 Mpc/h

Semi-analytic

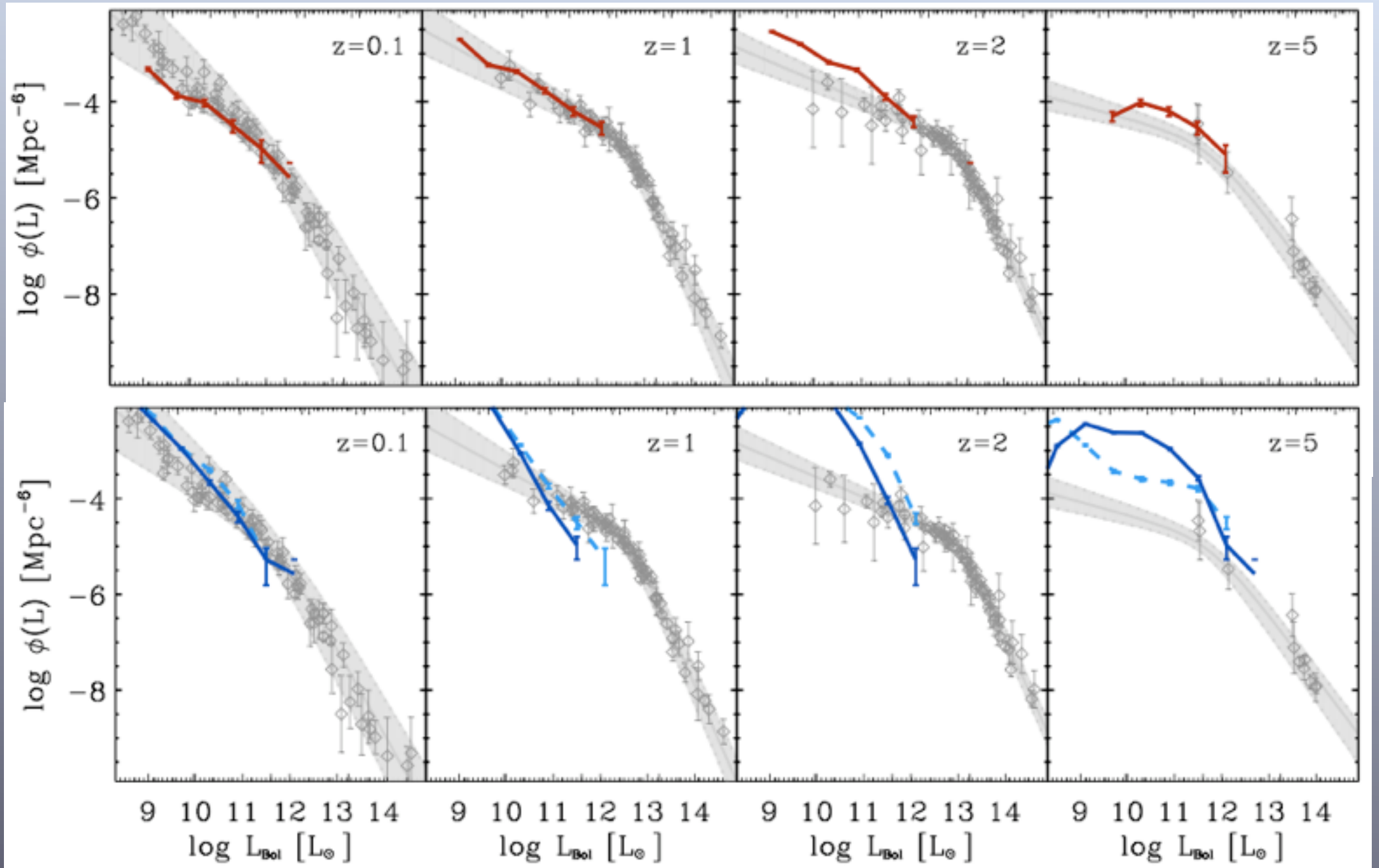


Hydro *(Gadget 3)*



Bonoli & Springel, in prep.

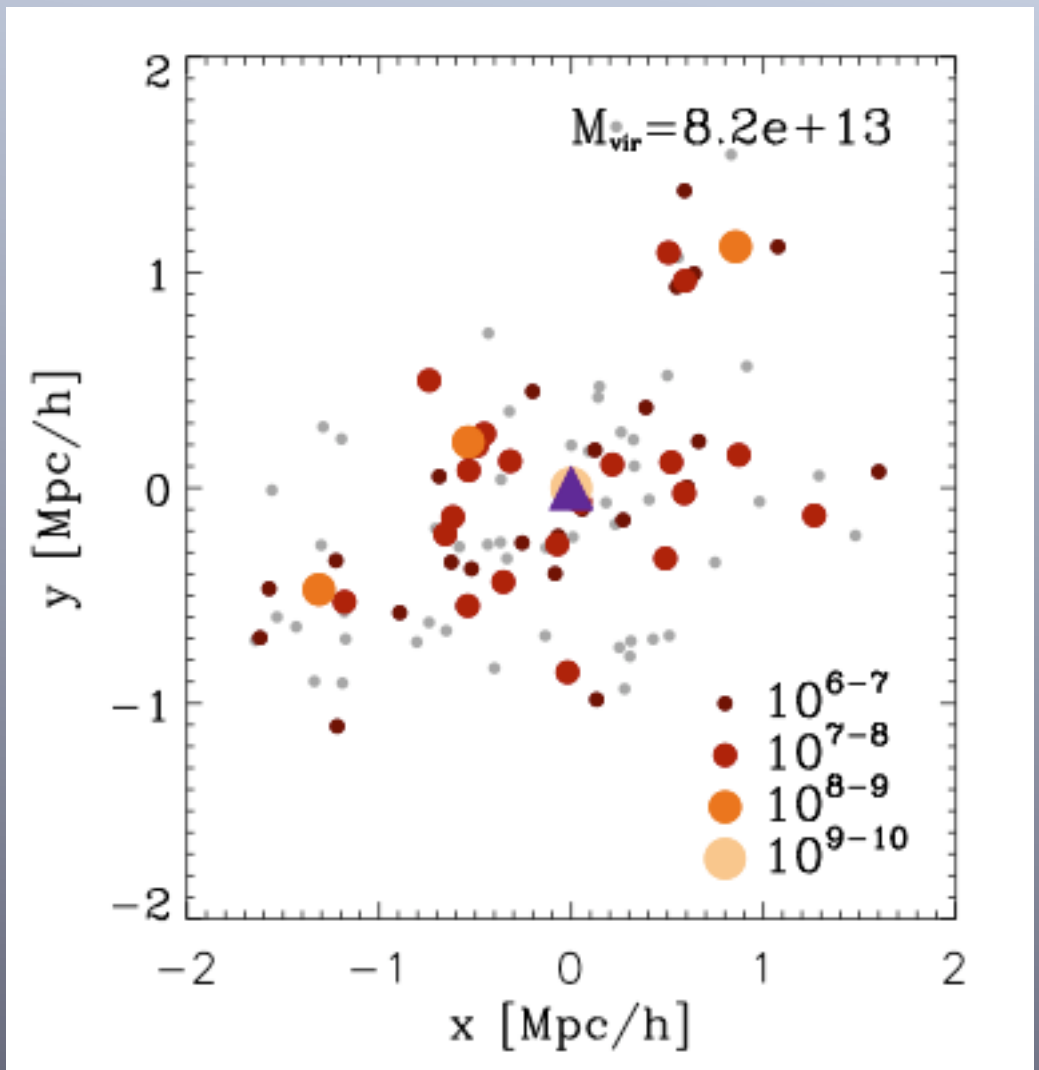
Direct comparison



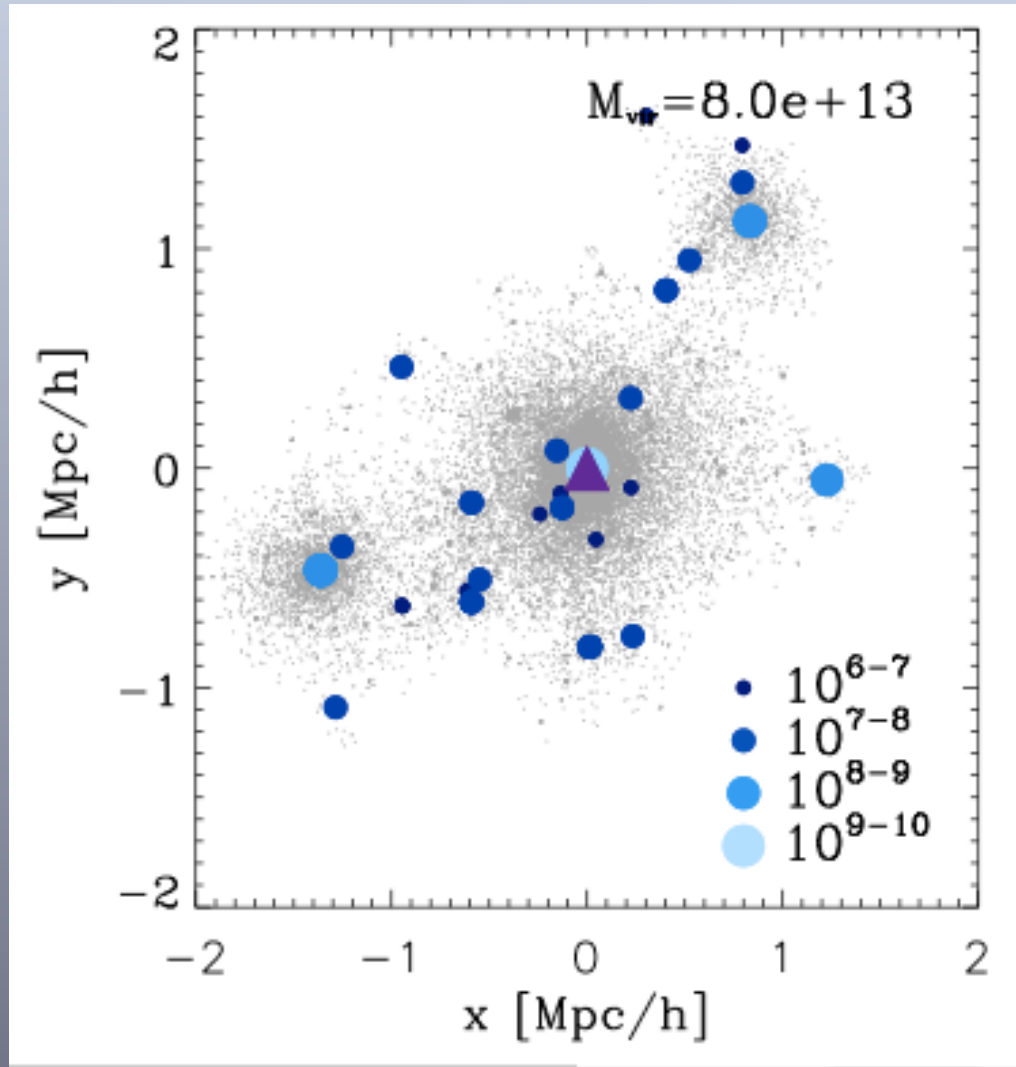
Bonoli & Springel, in prep.

Direct comparison

Semi-analytic



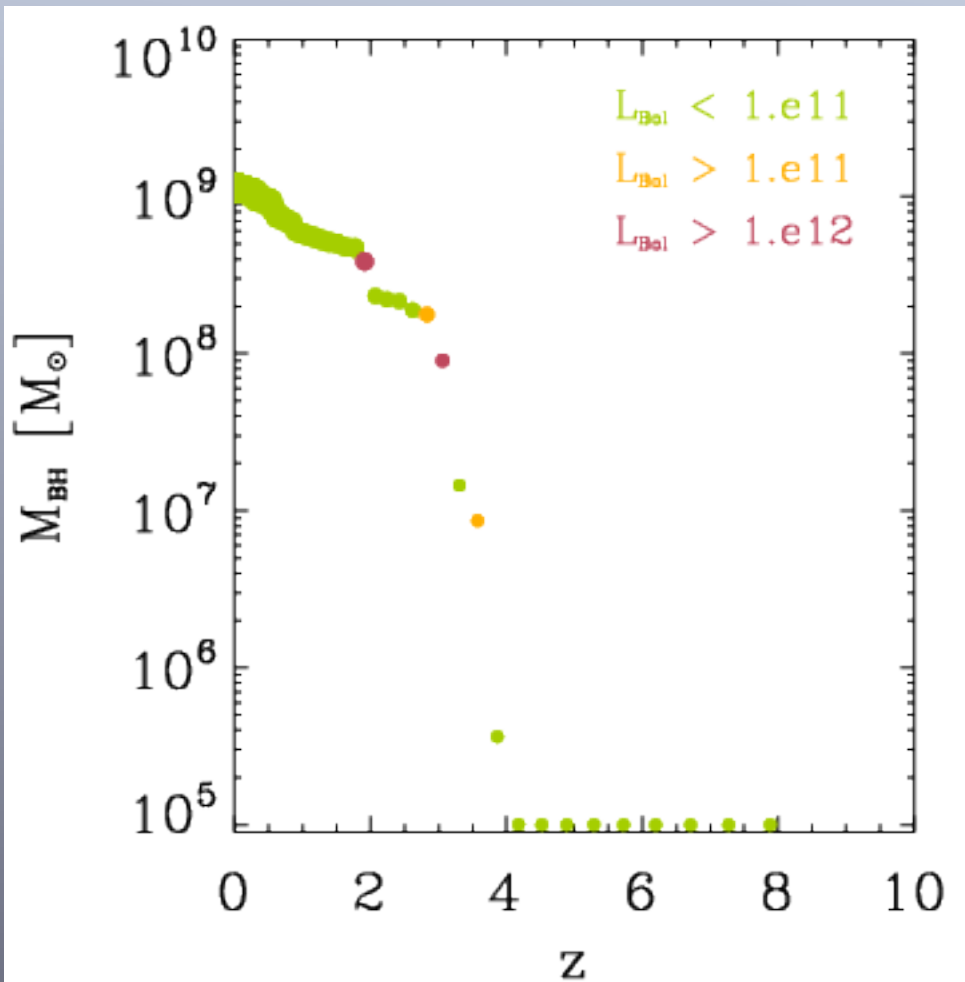
Hydro



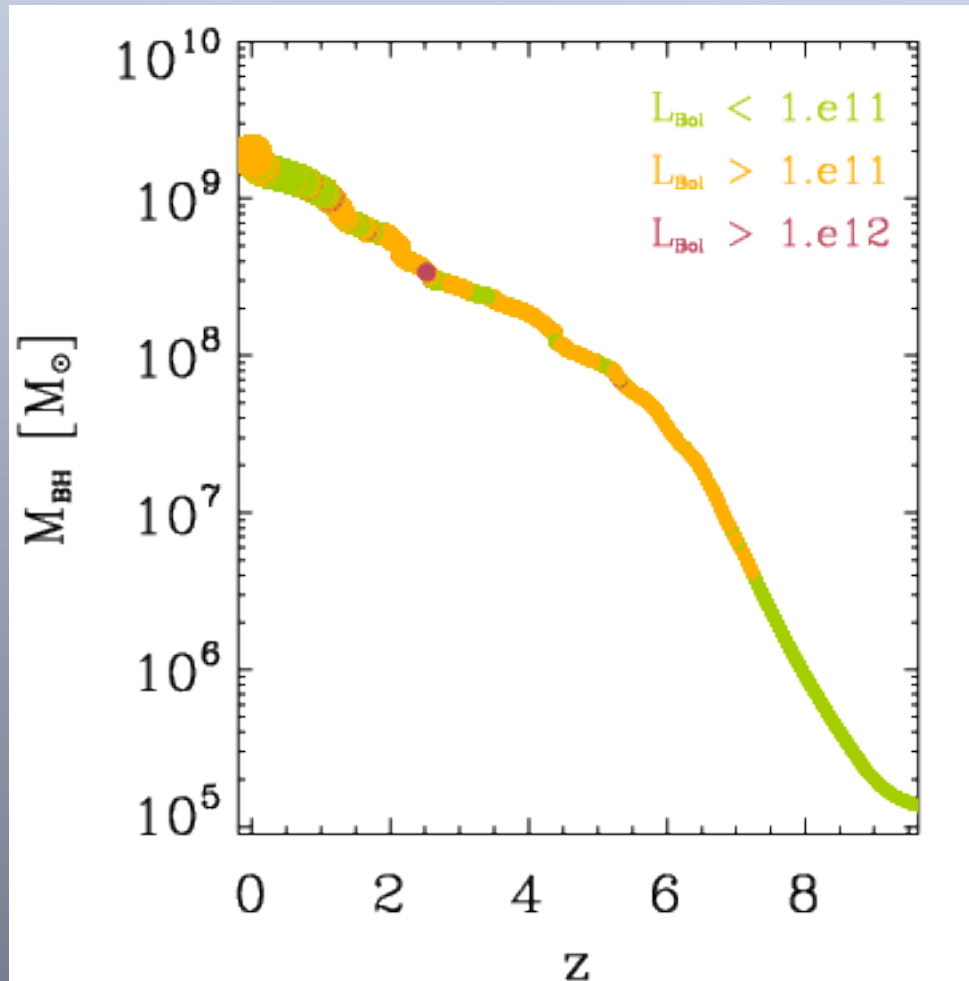
Bonoli & Springel, in prep.

Direct comparison

Semi-analytic



Hydro



Bonoli & Springel, in prep.

Large volumes are needed to study the statistics of quasars

Hydro simulations of cosmological volumes are still strongly limited by computational power

Models need to be improved!