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Cosmological mass transport on galactic nuclei and the growth of high z quasars

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By using AMR cosmological hydrodynamic N-body zoom-in simulations, with the RAMSES code, we studied the mass transport processes onto galactic nuclei from high redshift up to $z \sim 6$. Due to the large dynamical range of the simulations we were able to study the mass accretion process on scales from ~ 50 kpc to $\sim$ pc. The SMBHs are modelled as a sink particles at the center of our galaxies, which allowed us to quantify the BH growth in relation with the mass transport processes associated to different angular momentum fluxes. Such a quantification allowed us to identify the main mass transport process as a function of the scales of the problem. We found that in simulations that include radiative cooling and SNe feedback, the SMBH grows at the Eddington limit most of the time, transporting mass at a rate of $\sim$ 1-10 $M_{\odot}$/yr. Only if efficient AGN feedback is included in tandem with SNe feedback, the mass transport decreases at a rate below ~ 1 $M_{\odot}$/yr. This level of SMBHs accretion rates found in our cosmological simulation, are needed in all models of SMBH growth attempted to explain the formation of redshift 6-7 quasars.

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