Alex Razoumov

Resolving the ionization structure of DLAs

DLAs	spiral disks small clumps: infall, mergers, etc. outflows

These objects are very small —> need to use adaptive mesh refinement (AMR)

Ionization structure	collisional ionization radiative feedback from SF/etc. UV background

We have included simplistic radiative transfer into the AMR code ENZO

Approximations	no "direct" point sources background photons injected separately on diff. levels of resolution freq. dependency via multicomponent transfer

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New features	simultaneous RT and hydro RT done for the first time in AMR RT parallelized on the base grid, on subgrids automatic parallelization

Immediate goal – to study morphologies and kinematics of DLAs in a small volume

64^3,L4	64^3,L5	64^3,L6
1 kpc	0.5 kpc	0.25 kpc

mass resolution 1.49e6 Msun

optically thin ⟶ RT
star formation on/off
mechanical feedback on/off

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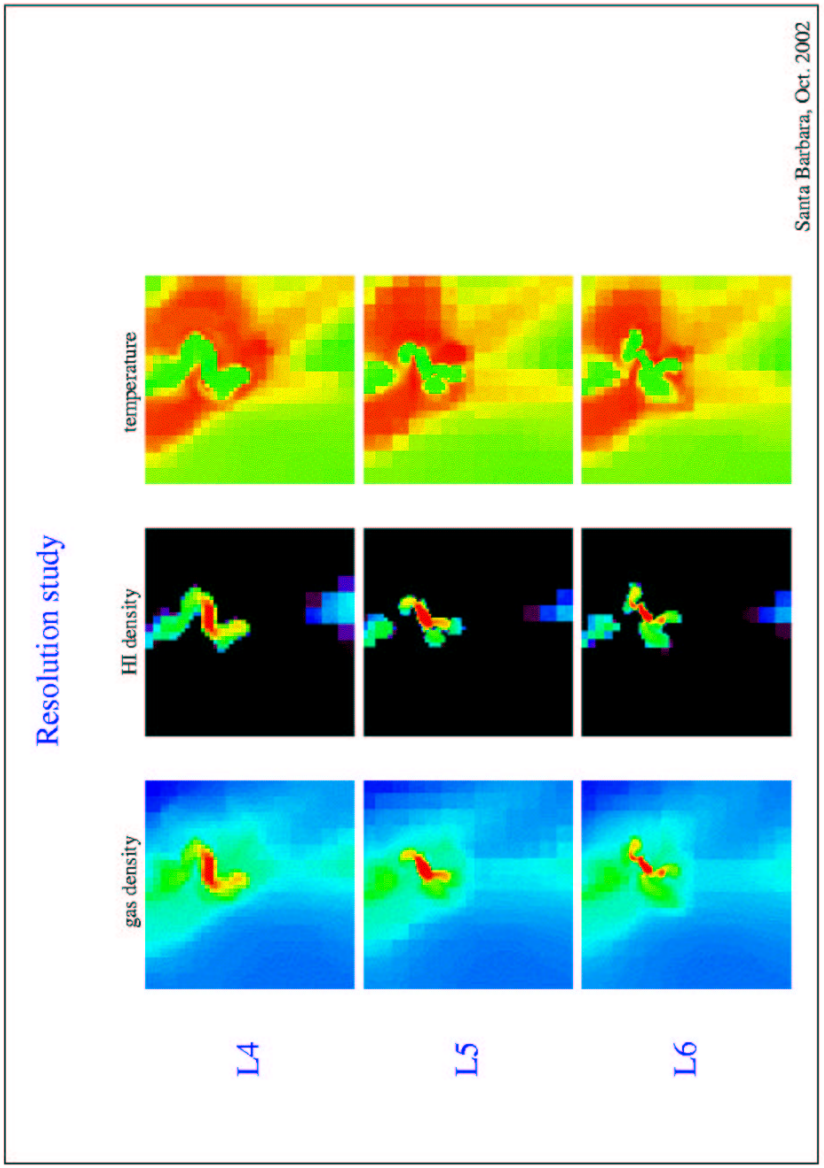
Resolution study
temperature
HI density
gas density
L4
L5
L6
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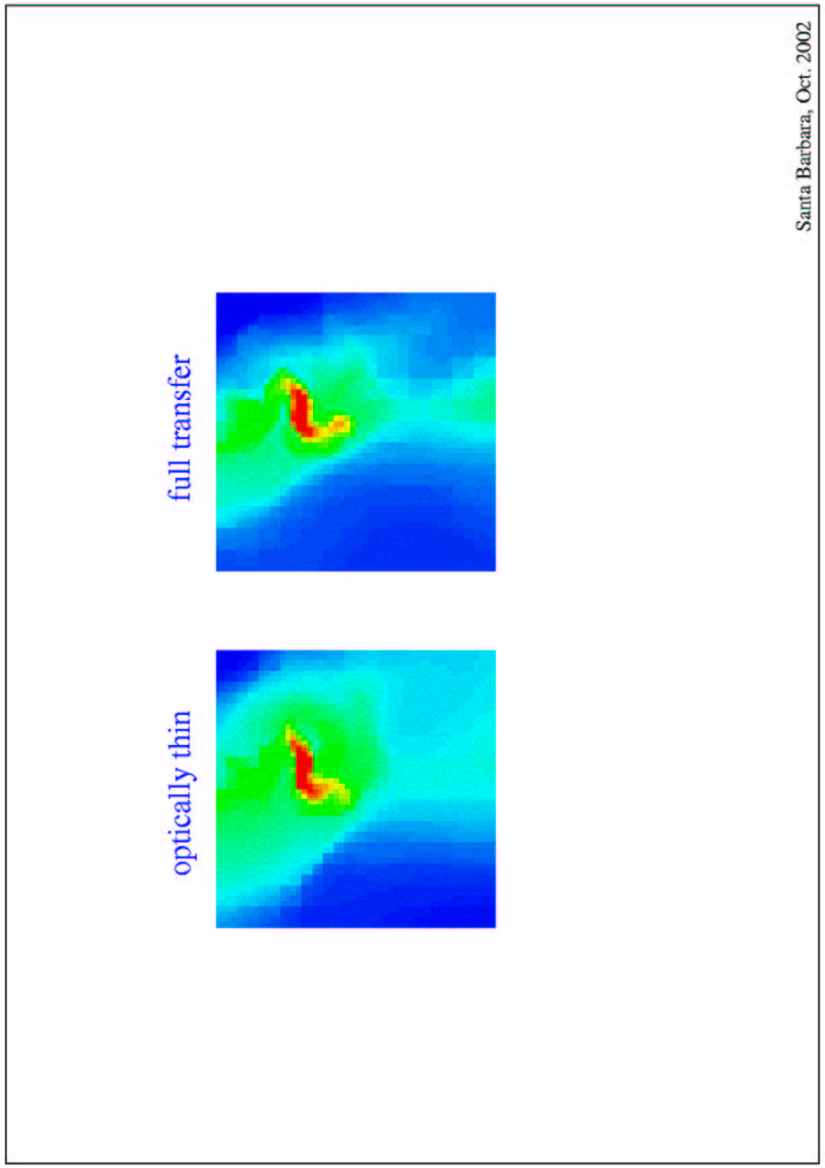
full transfer
optically thin
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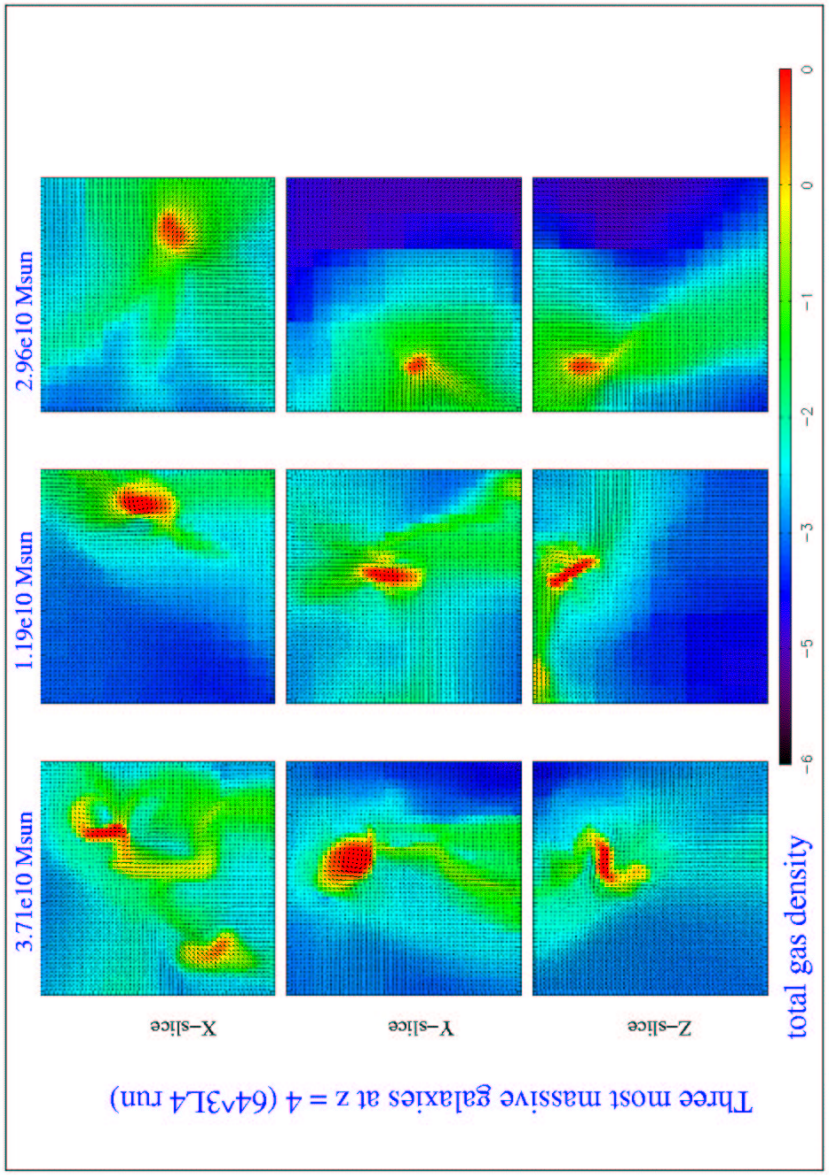
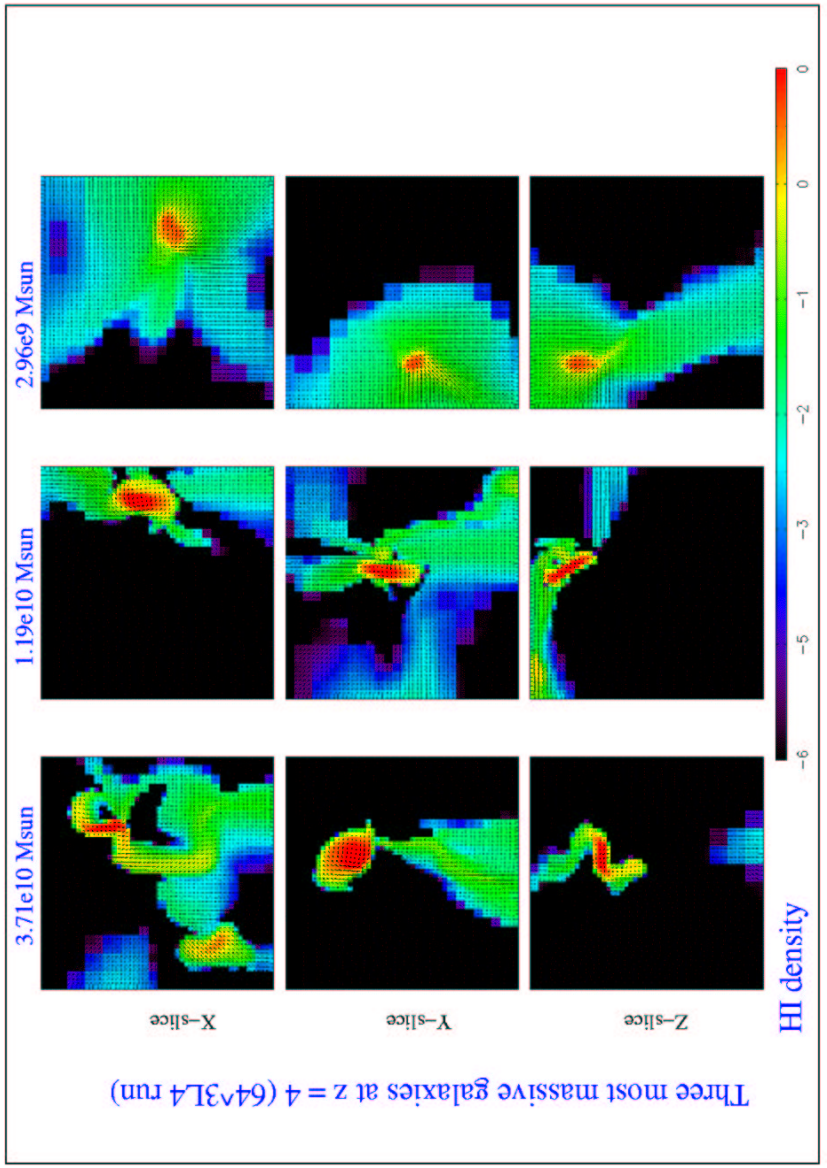
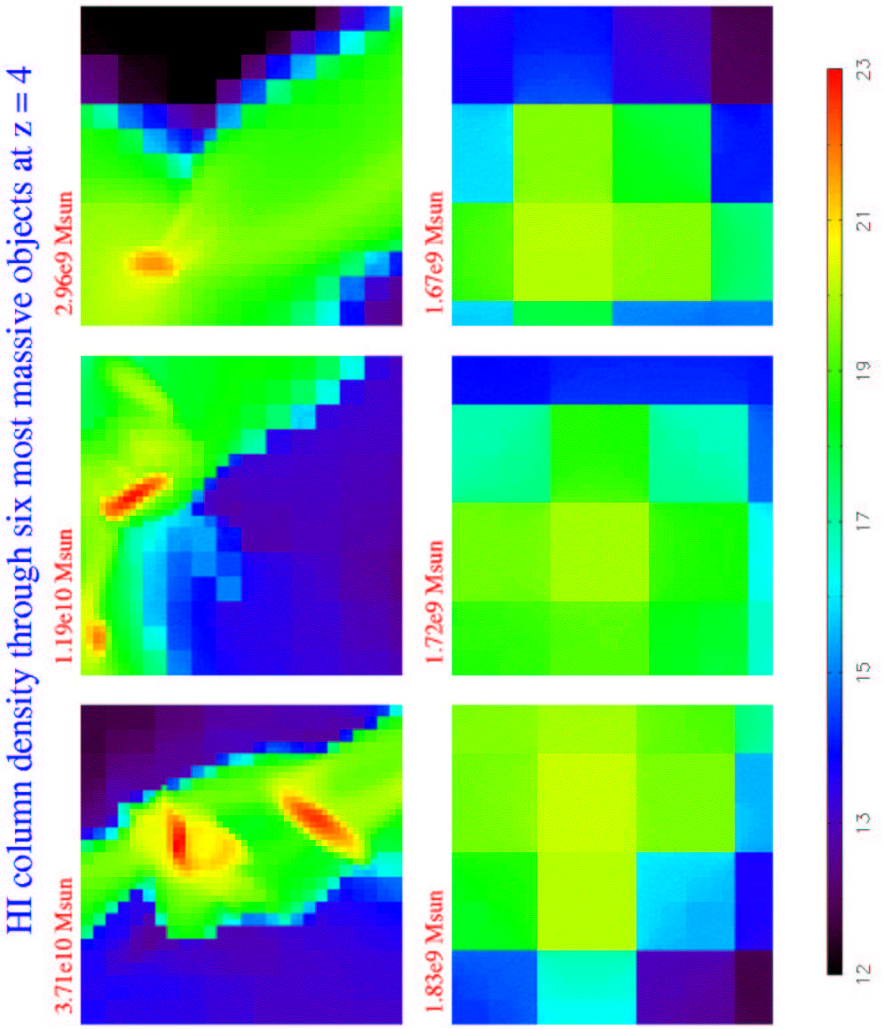
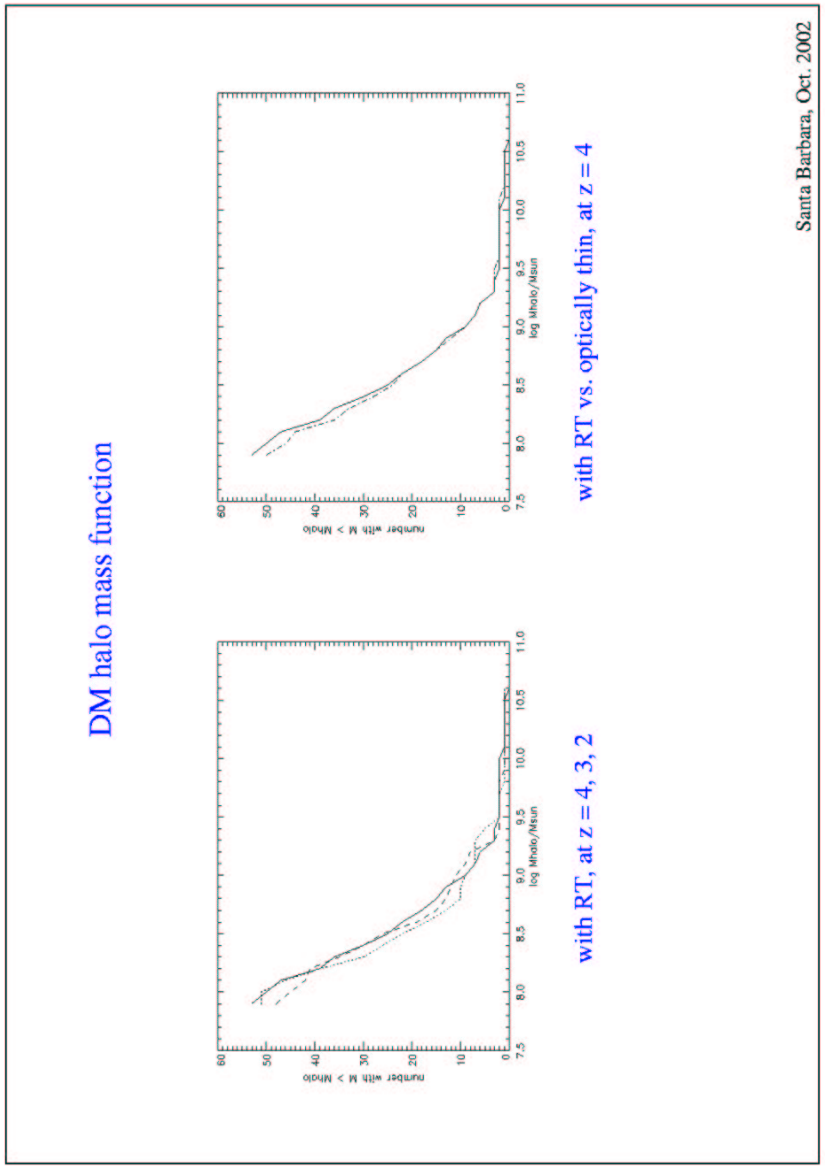

2.96e10 Msun
1.19e10 Msun
3.71e10 Msun
X–slice
Y–slice
Z–slice
total gas density
0
0
−1
−2
−3
−5
−6
Three most massive galaxies at z = 4 (64^3L4 run)


2.96e9 Msun
1.19e10 Msun
3.71e10 Msun
X–slice
Y–slice
Z–slice
HI density
0
0
−1
−2
−3
−5
−6
Three most massive galaxies at z = 4 (64^3L4 run)


HI column density through six most massive objects at z = 4
3.71e10 Msun
1.19e10 Msun
2.96e9 Msun
1.83e9 Msun
1.72e9 Msun
1.67e9 Msun
12
13
15
17
19
21
23


DM halo mass function
with RT, at z = 4, 3, 2
with RT vs. optically thin, at z = 4
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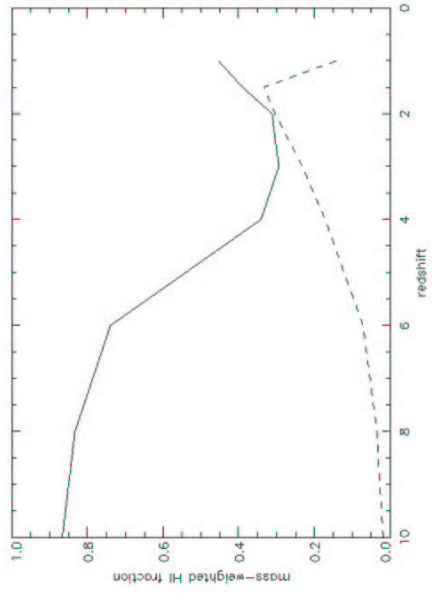
HI mass fraction: RT vs. optically thin



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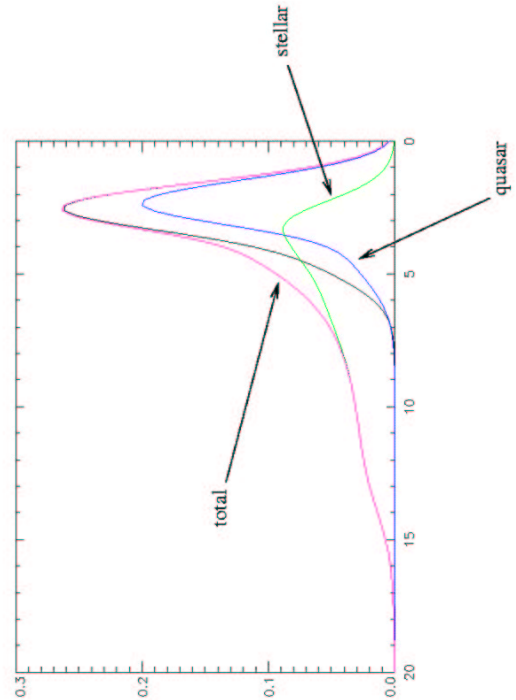
assumed UVB



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