large-scale simulations of large-scale structures

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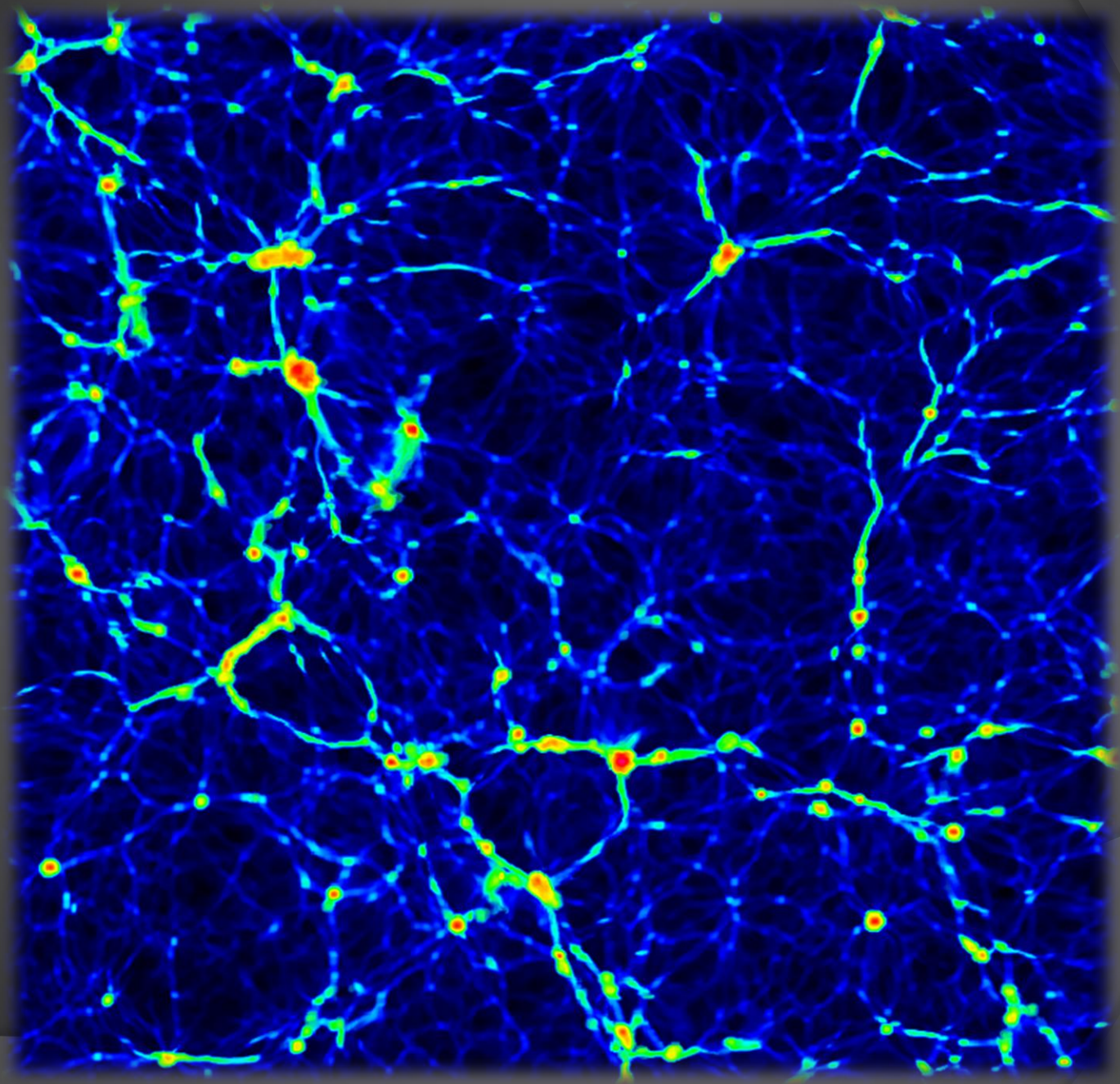
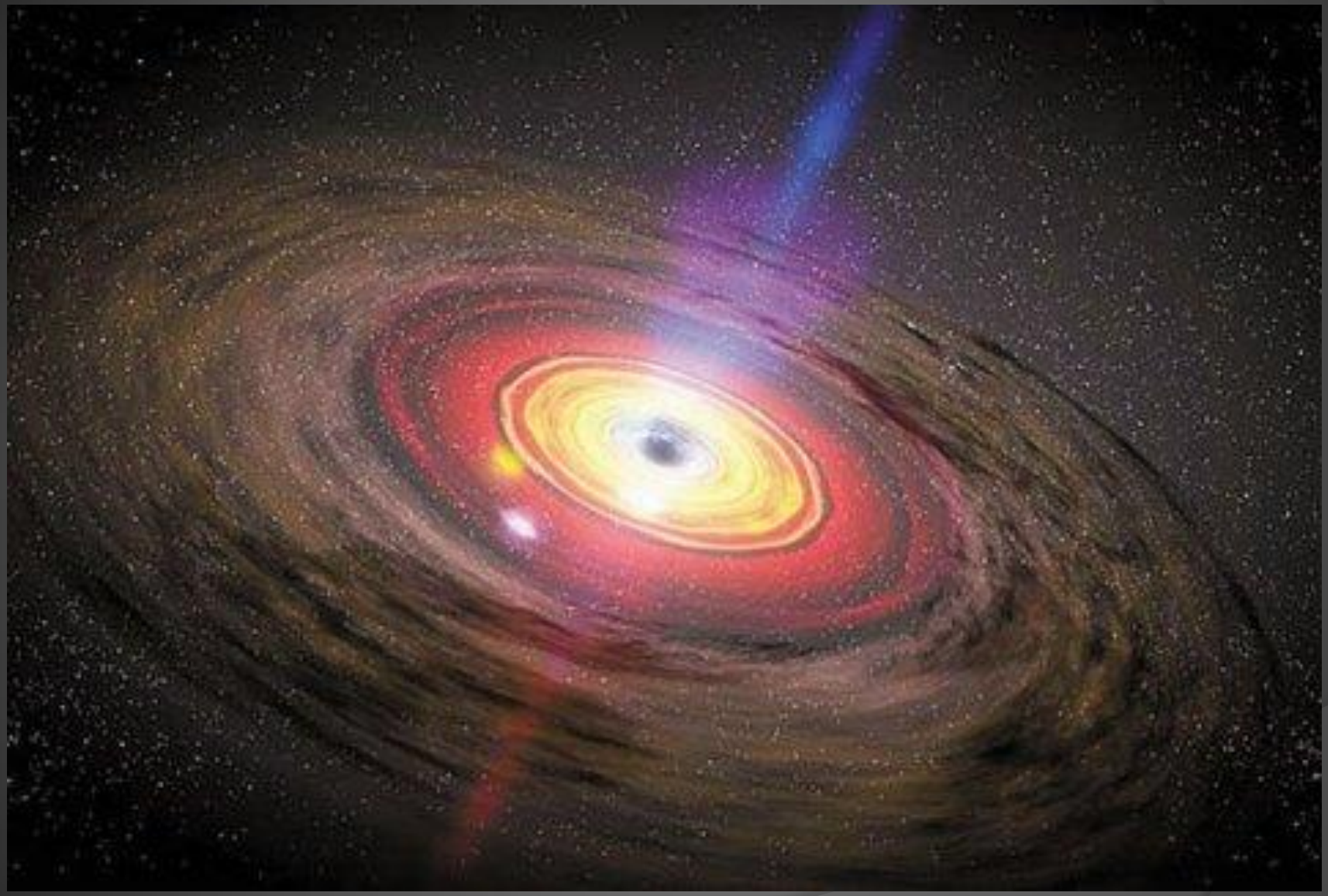
DOE CSGF



THE BULLET CLUSTER
X-ray: NASA/CXC/M. Markevitch et al.
Optical: NASA/STScI/Magellan (Univ. of Arizona)/D. Clowe et al.
Astronomy
magazine

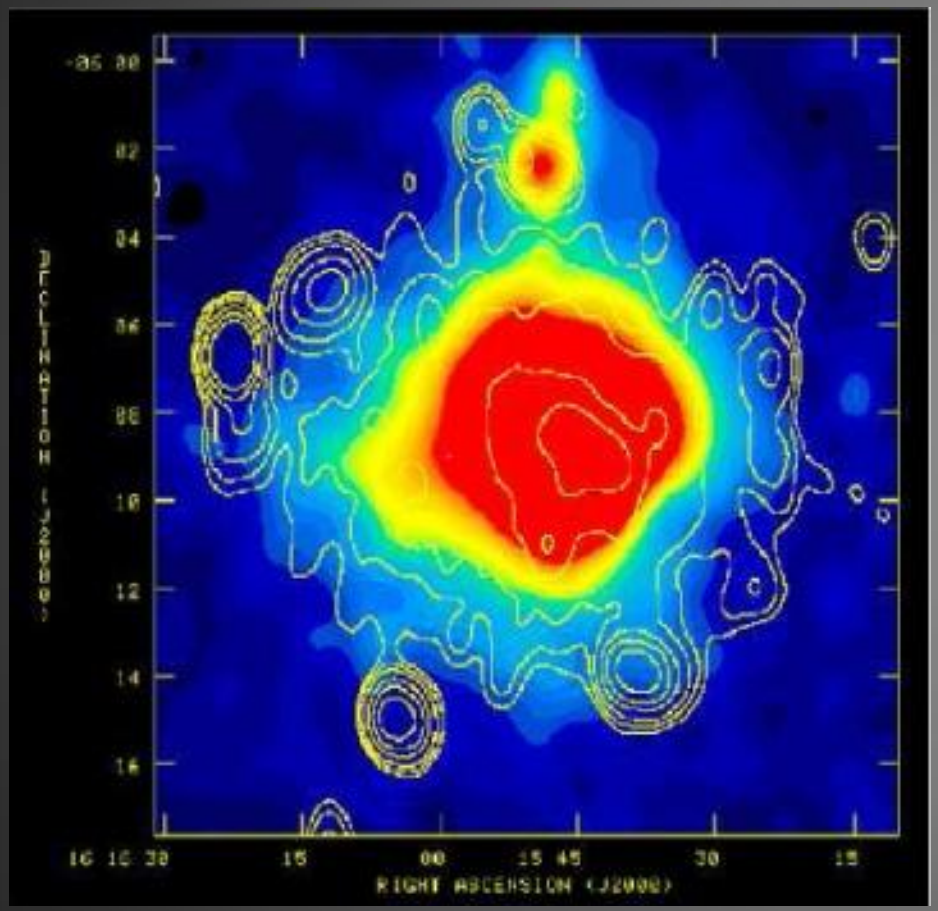


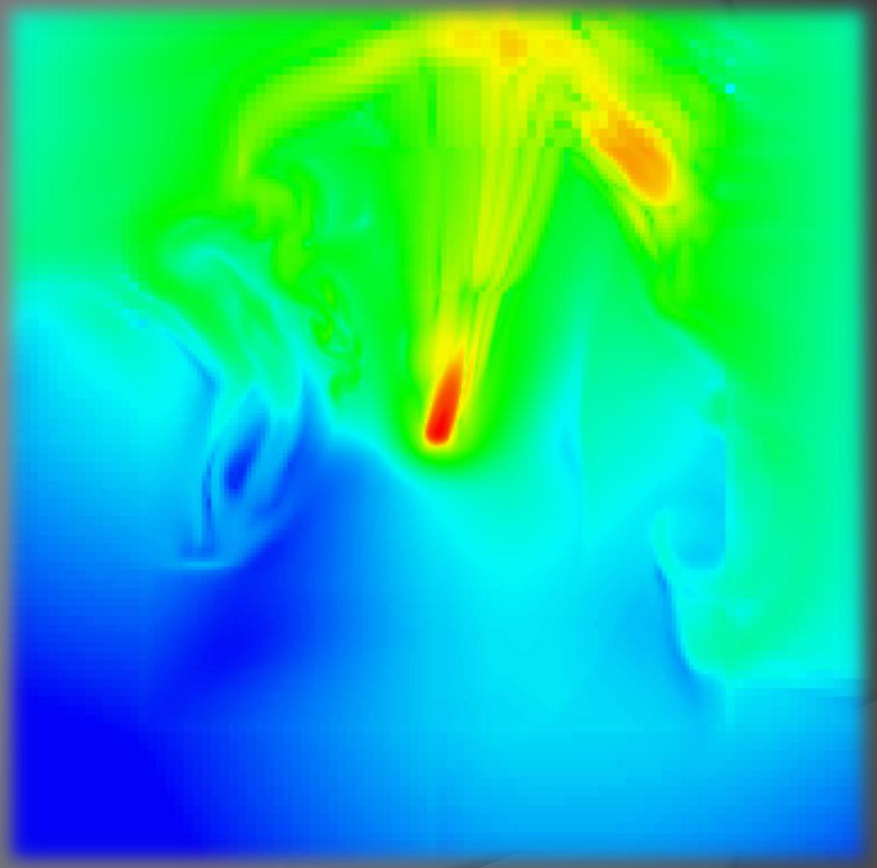
(NASA / Dana Berry)

Abell 2163

1.4Ghz Radio Contours (GMRT, India)

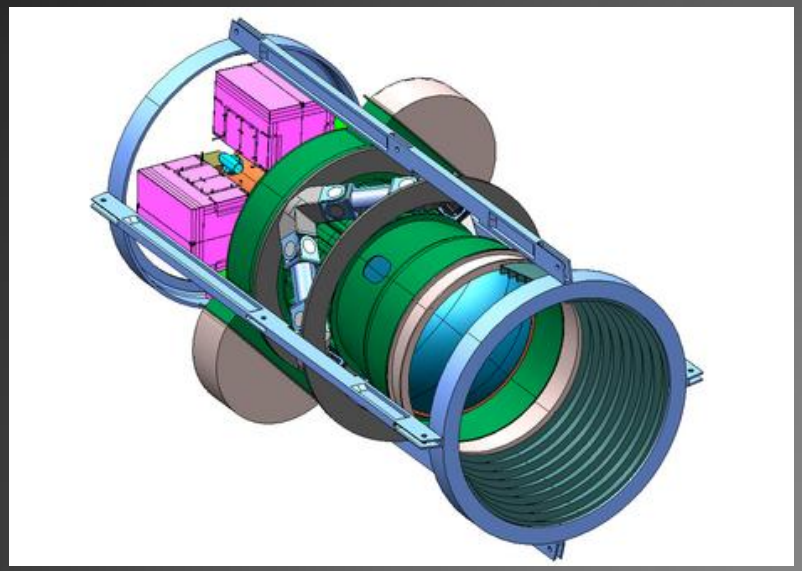
and ROSAT X-ray emission

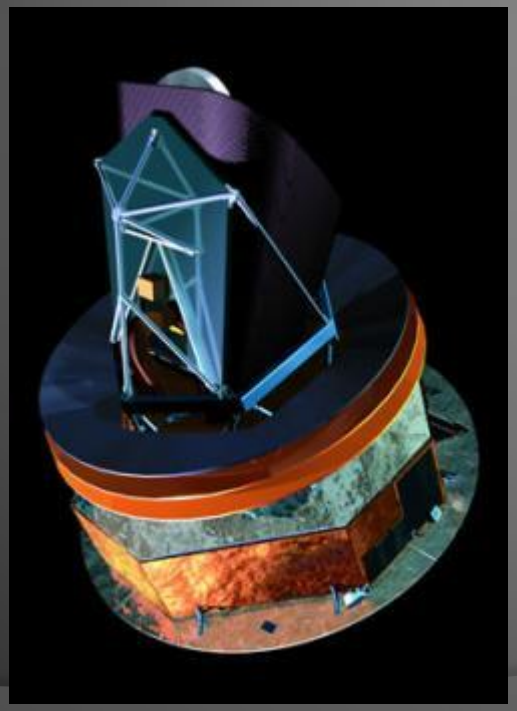




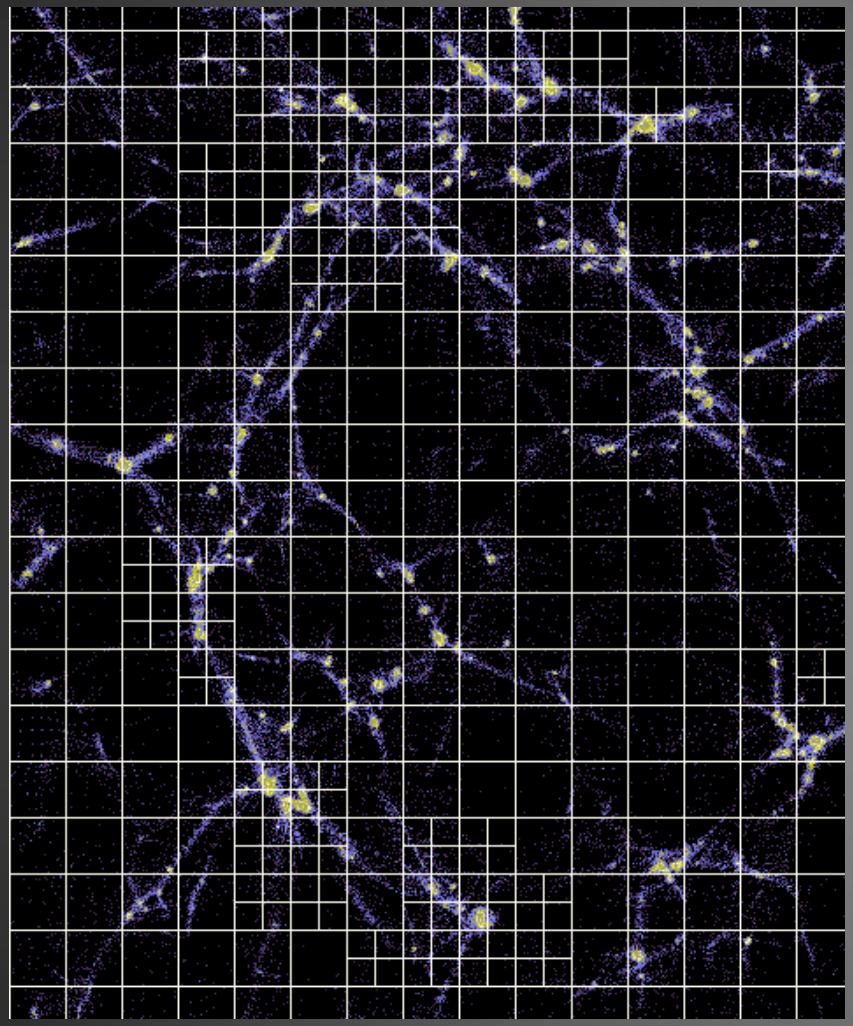
(Feretti et al. 2001)

a challenge: matching observations

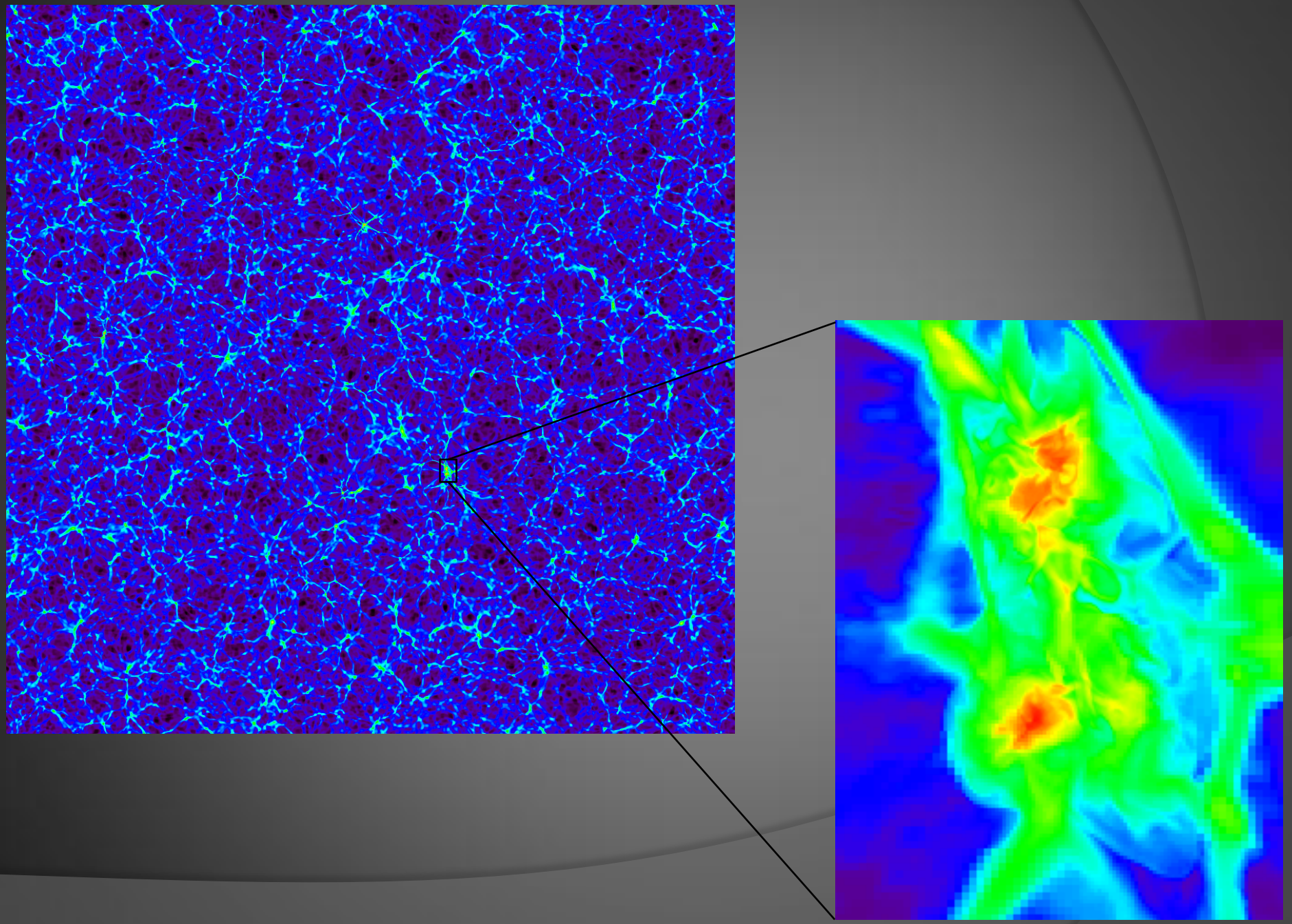




(Fryxell et al. 2000)



- oct-tree adaptive mesh refinement
- gravity: *N*-body particle-mesh multigrid/PFFT
- hydro: PPM
- MHD: staggered mesh
- sutherland & dopita cooling function
- on-the-fly halo finding
- subgrid models
- scales well to >100,000 processors



- correlate multiple data sets
  - grid: gas data
  - particles: dark matter
  - objects: black holes
  - derived data: halos
- describe vector information
  - gas velocity
  - magnetic fields
- on-the-fly visualization