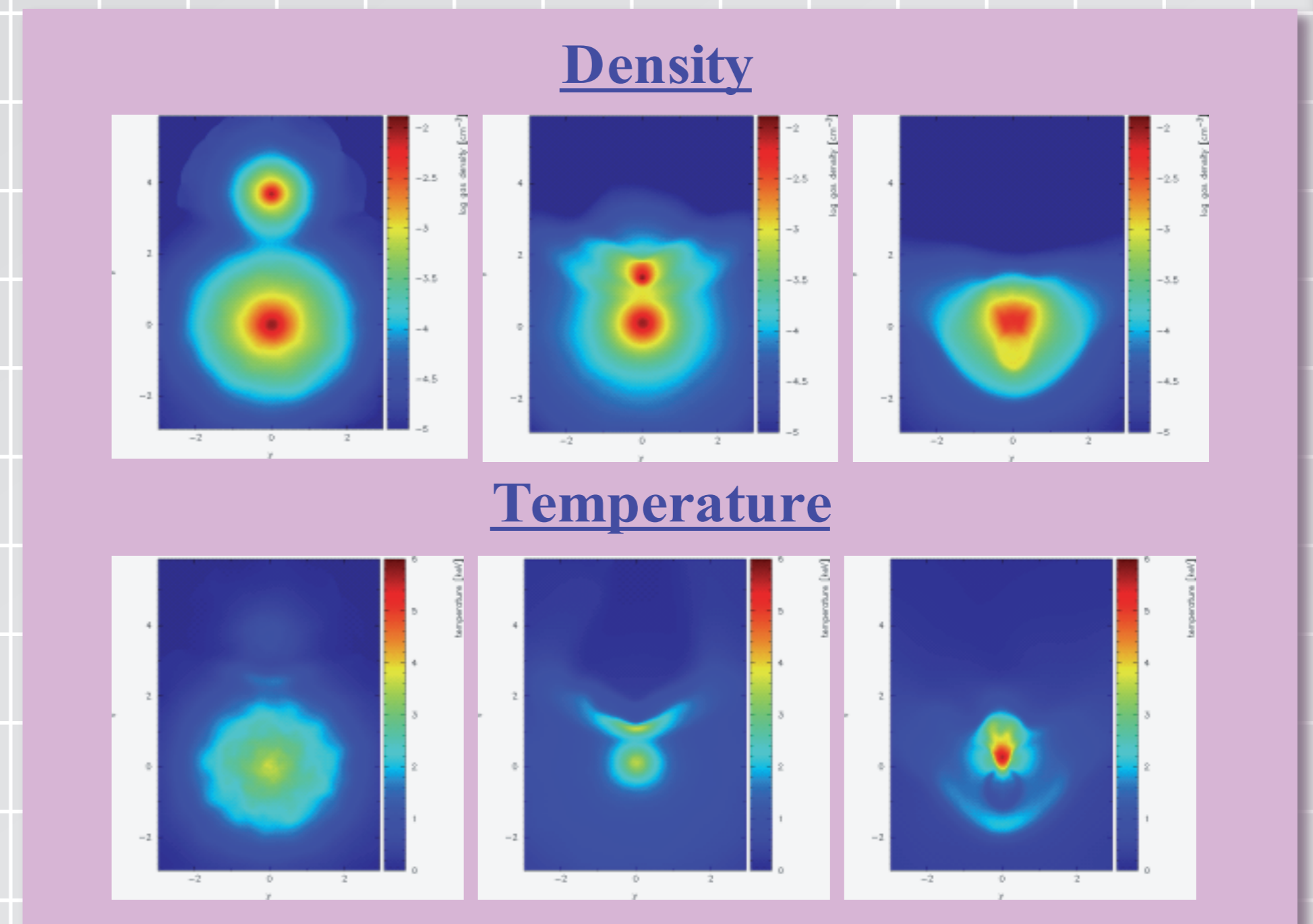


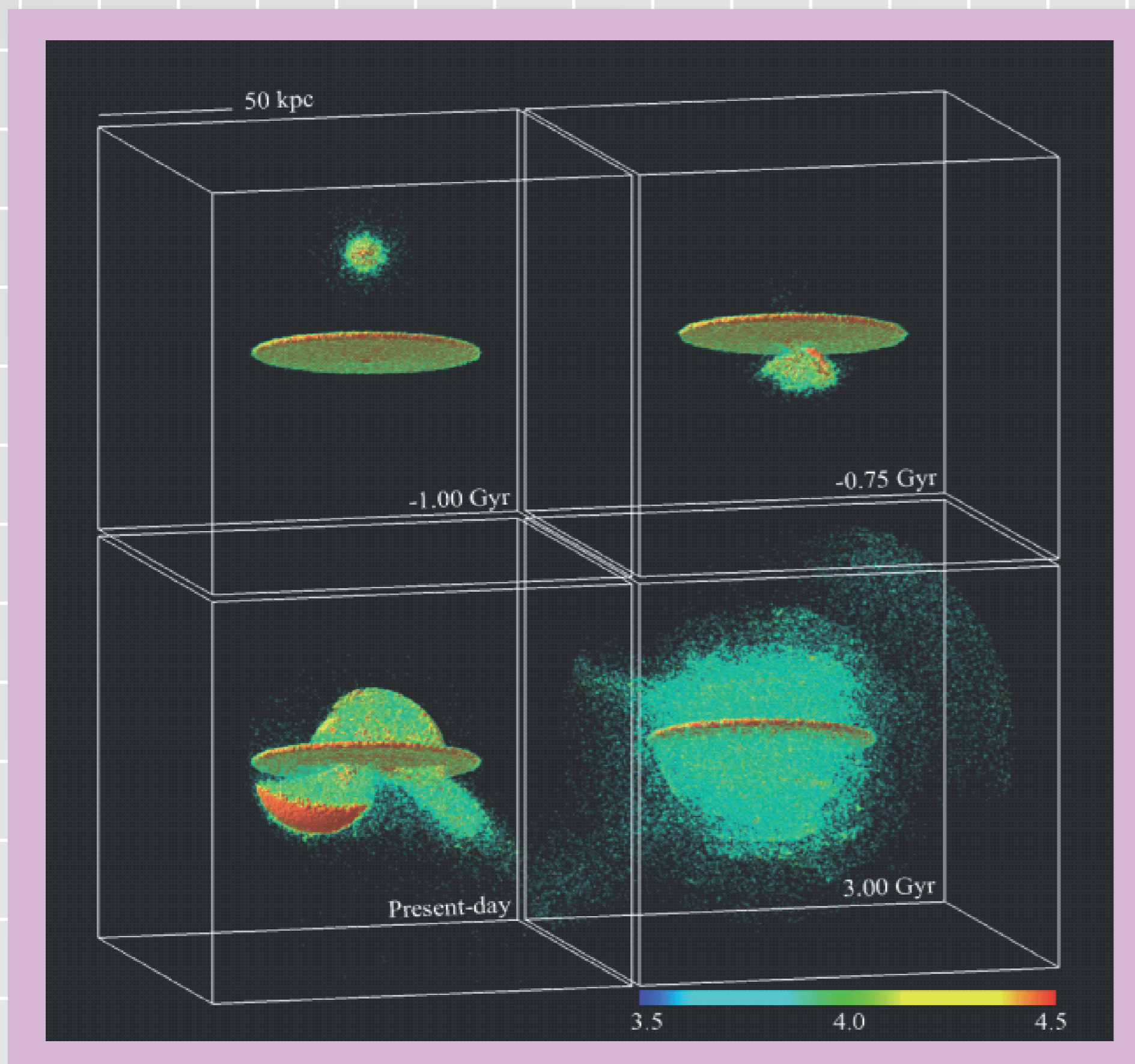
# Astrophysical Simulations (2)

## Merger of galaxy clusters

In the standard cosmological model, it is believed that galaxy clusters have experienced multiple mergers of galaxies and of galaxy groups. Non-equilibrium states of intracluster plasma are good probes for understanding their formation histories. The *FIRST* simulator enables us to simulate the dynamical evolution of merging clusters, in parallel with calculations for dozens of non-equilibrium electron states of oxygen, iron, and other heavy elements in the plasma.



## Interaction between Andromeda galaxy and a satellite



Using parallel *N*-body simulations with 40 million particles, we have studied the interaction between the Andromeda galaxy and its satellite. The simulation nicely reproduces the giant stellar stream discovered at the southern part of the Andromeda galaxy. Moreover, the results show that several of observed faint features in the Andromeda galaxy can be explained as the forward continuation of the giant stellar stream.

## Phantom-GRAPE

Using the capability of SSE (Streaming SIMD Extensions), a numerical library to accelerate the computation of *N*-body gravitational forces is developed, which is named "Phantom GRAPE" after the conventional GRAPE system, and achieved 18GFLOPS performance on a single core of Core 2 Duo (2.4 GHz) processors.

