The mechanism of suppressed dynamical friction in a constant density core of dwarf galaxies

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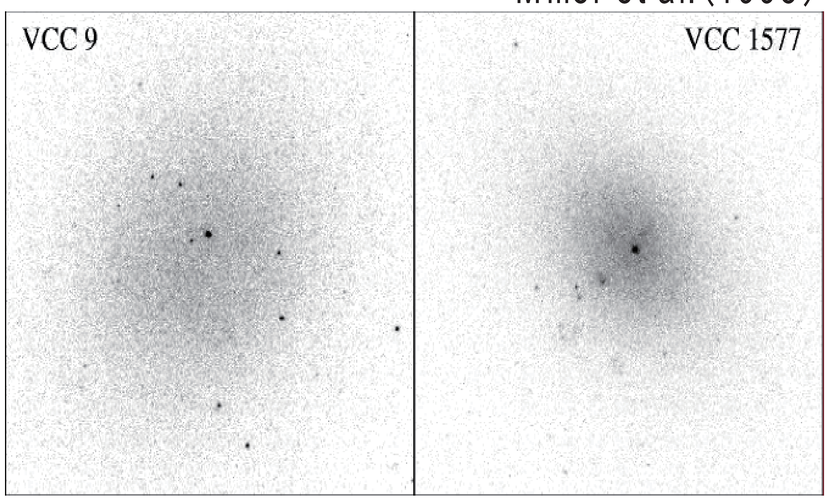
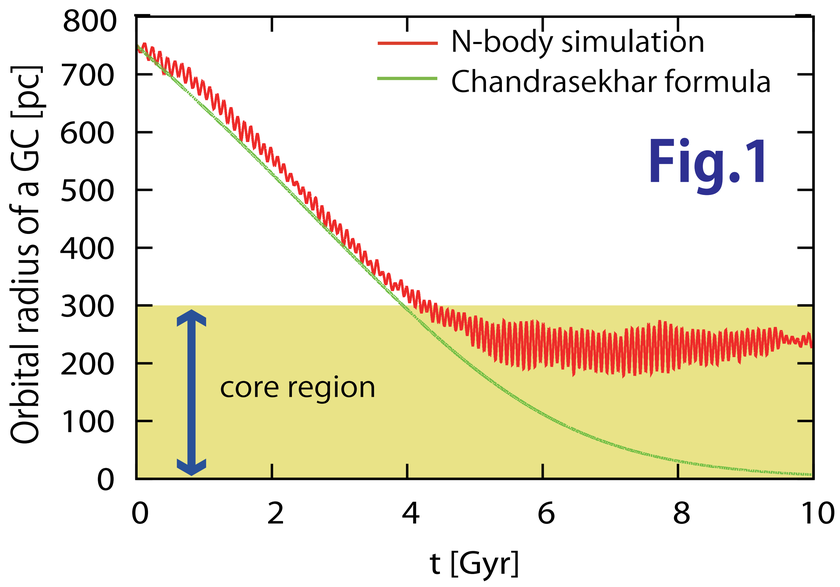
Abstract : **Dynamical friction problem is a long-standing dilemma. In dwarf galaxies, dynamical friction on their globular clusters (GCs) is too strong to keep their orbital motions. Nonetheless, GCs do exist even in current dwarfs. However, a solution have been proposed. If dwarf galaxies have a cored dark matter halo which has a constant density region in its center, the dynamical friction is significantly weakened. But, the mechanism of the suppressed dynamical friction has not been clarified yet.**

By means of N-body simulation, I find that the mechanism of the suppressed dynamical friction is the effect of orbital resonance between the GC and the halo.

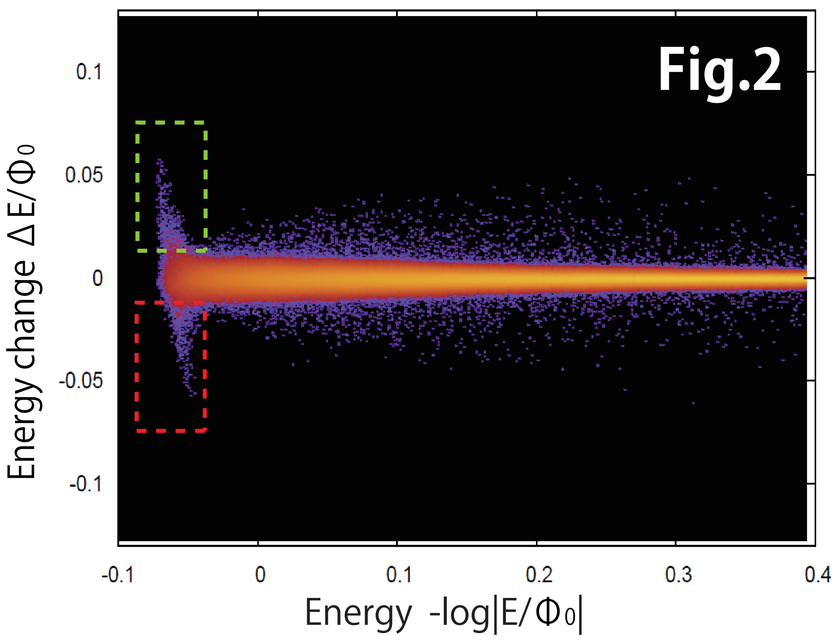
Miller et al. (1998)



dwarf galaxeis and their GCs



A favorable answer to "the cusp-core problem" : In Fig.1, I show a result of my simulation. As mentioned above, the GC can survive from the strong dynamical friction in the cored structure. This result impllies that the cored halo is a favorable dark matter structure for dwarf galaxies on the point of the existence of the GCs in dwarfs.



The mechanism of the suppressed dynamical friction : I examine orbital energies and changes of the energies of halo particles (E- Δ E diagram, Fig.2). I find that the energies of some particles largely increase or decrease (the green & red squares on Fig.2) and these particles have prograde rotations with the GC. These particles resonate with the GC and have very complex orbits. In Fig.3, I show a example of the orbits in the rotating coodinate of the GC.

I extract such resonant particles and calculate energy transfers from the resnant particles to the GC. I find that the resonant particles inject energy to the GC (Fig.4).

This result means that the dynamical friction on the GC is canceled out by the resonant particles in the core structure.