Contribution ID: **81** Type: **not specified**

The energy evolution of dark matter halos: how to fit observational data?

Monday 27 July 2015 17:20 (20 minutes)

The question of the density profile of dark matter halos is extremely important for various topics of the dark matter physics. In principle, it can shed light on the physical nature of the dark matter. Now the contradiction between the standard dark matter paradigm and observations seems obvious. The main aim of the talk is to discuss the ways to agree theory with observations. We show that it is the energy evolution of a forming halo that determines the shape of its density profile. If the energy relaxation is moderate, the profile has a central core, and its shape exactly the profile that observations suggest for the central region of galaxies.

If the dark matter halos have cores, it leads to many important consequences. A very general cosmological consideration suggests that, along with galactic dark matter halos, much smaller dark matter structures may exist. These structures are usually called 'clumps', and their mass extends to $10^{-6}M_{\odot}$ or even lower. The clumps should give the main contribution into the signal of dark matter annihilation, provided that they have survived until the present time. We consider cored clumps and show that they are significantly less firm than the standard cuspy ones.

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Session Classification: CALC2015 Workshop