

# CU Physics Department Colloquium

Monday, April 27, 2009 4:10 PM 428 Pupin Hall

## Dark Matter in the "Bullet Cluster" 1E0657-56 and MACSJ0025-1222:

### Revealing the Invisible with 2 Cosmic Supercolliders

The cluster of galaxies 1E0657-56 has been the subject of intense research in the last few years. This system is remarkably well-suited to addressing outstanding issues in both cosmology and fundamental physics. It is one of the hottest and most luminous X-ray clusters known, and is unique in being a major supersonic cluster merger occurring nearly in the plane of the sky, earning it the nickname "the Bullet Cluster". Recently we have discovered a new Bullet-like cluster, MACSJ0025-1222. Although it does not contain a low-entropy, high density hydrodynamical 'bullet,' this cluster exhibits many similar properties to the Bullet Cluster, and so we also use it to study dark matter.

In this talk I will present our measurements of the composition of both systems (using gravitational lensing), show the (independent) evidence for the existence of dark matter, and describe limits that can be placed on the intrinsic properties of dark matter particles. In doing so, I will explain how these clusters offer a serious challenge to Modified Newtonian Dynamics (MOND) theories. Finally I will conclude with some preliminary results we have on using the Bullet cluster as a 'cosmic telescope' to explore the Universe in its infancy.

**Maruša Bradač, University of California, Santa Barbara**

Hosted by Emlyn Hughes – Meet the Speaker at 3:30 PM in 705 Pupin Hall

