

Dark matter and the bullet cluster

M. Markevitch (1), S. Randall (1), D. Clowe (2), A. Gonzalez (3), M. Bradac (4)

(1) Harvard-Smithsonian Center for Astrophysics, (2) University of Arizona, (3) University of Florida, (4) KIPAC, Stanford University

1E0657-56, the "bullet cluster", is a merger with a uniquely simple geometry. From the long Chandra X-ray observation which revealed a classic bow shock in front of a small subcluster, we can derive the velocity of the subcluster and its direction of motion. Recent accurate weak and strong lensing total mass maps clearly show two merging subclusters, including the host of the gas bullet seen in X-rays. This cluster provided the first direct, model-independent proof of the dark matter existence (as opposed to any modified gravity theory) and a direct constraint on the self-interaction cross-section of the dark matter particles. I will review these and other related results.