Abstract Submitted
for the TSF12 Meeting of
The American Physical Society

Testing GR and Studying Dark Matter in the Aftermath of Galaxy Clusters Colliding LINDSAY KING, University of Texas at Dallas, HELEN RUSSELL, University of Waterloo, Canada, REBECCA CANNING, Stanford University, DOUGLAS CLOWE, Ohio University — Astrophysical observations are consistent with most of the universe being dark: dark matter - predominantly cold - and dark energy. Unlike normal baryonic matter that we see directly, these dark components are studied via their impact on the dynamics and geometry of the universe, and on the growth of massive structures. Galaxy clusters are the most massive bound objects in the universe. Most of their normal matter is in the form of hot gas that emits X-rays. Seeing clusters after they have violently merged is very rare, but such systems are critical in testing gravity and general relativity on large scales, and in refining our understanding of dark matter. Dark matter and hot gas behave differently during a merger, with the hot gas becoming retarded and separated from the dominant dark matter. I discuss the importance of these systems, and outline how their strong and weak gravitational lensing signatures are used to map their mass - independent of it being luminous or dark. This map is compared with the distribution of the hot gas revealed by X-ray telescopes. Then I describe our current work on a unique galaxy cluster merger system.

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Date submitted: 22 Sep 2012 Electronic form version 1.4