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Title: Strong Gravitational Lensing and Catastrophe Theory

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Abstract: Gravitational lensing, bending of light rays due to gravitational potential, can lead to formation of highly distorted and multiple images of distant objects. Though the theoretical understanding of the phenomena came from predictions of Einstein's General theory of Relativity, it is since thirty years ago that it has been possible to observe it with the aid of a number of highly sensitive telescopes. Subsequently, it was understood that gravitational lensing can be used as a tool to map the gravitational potential of clusters and galaxies in detail. In the last three decades the focus has firmly been on generic and stable image configurations (cusps and folds) or on statistical determination in the limit of weak distortions. However, with improvement in sensitivity and sky coverage, rare image configurations are likely to be detected with upcoming instruments like LSST (Large Synoptic Survey Telescope). In this project we intend to identify and map different types of singularities in image plane for a given lens potential. We have also studied generic image forms for each type of singularity.

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