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Gravitational lensing induced by matter currents

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In this talk I will present the effects of gravitational lensing induced by the motion of massive objects. This is a relativistic effect and is much weaker than the deflection of light by density inhomogeneities. I will first discuss the effects of gravitational lensing by density perturbations and then generalise this to other possible inhomogeneities that may exist in our Universe, vector and tensor perturbations. Then I discuss the case of an isolated moving lens, a specific form of vector perturbation. I show that while subdominant to the density term future surveys will be able to measure this effect by cross-correlating the lensing convergence field with a reconstructed cosmic-momentum field. I present details of this reconstruction from galaxy redshift surveys and from the kinetic Sunyaev-Zel'dovich effect. I conclude by presenting forecasts for the next generation of cosmological survey.

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