
Solvay Colloquium

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Shocks in the Early Universe and their possible consequences

In the last few years, cosmology has converged on a remarkably simple phenomenological fit: the Λ CDM (Lambda Cold Dark Matter) model. Many basic features of this model pose deep mysteries: the dark energy and dark matter, the initial singularity and the final de Sitter phase. In this talk, I will explain an unexpected prediction of the model which we have recently discovered, namely the breakdown of linear perturbation theory in the radiation-dominated early phase. The scale-invariant, linear curvature perturbations assumed in the model become oscillating acoustic modes once they cross the Hubble radius. Although their amplitude is small - of order a part in ten thousand - they oscillate through many periods. After around ten thousand oscillations, the waves steepen and form shocks. The shocks create entropy and the shock collisions create vorticity. I will describe how this vorticity may lead to some dramatic consequences, including the growth of primordial magnetic fields.

Tuesday 7 July 2015 at 4.00 P.M.

COFFEE AND TEA WILL BE SERVED AT 3.45 P.M. IN FRONT OF THE SOLVAY ROOM

SOLVAY ROOM

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