# Physics Department Seminar


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## Whispers in the Dark


One of the greatest mysteries of the Universe that, for the present, puzzles the mind of most astronomers, cosmologists and physicists is the question ``What makes up our Universe?''. This is due to how a certain substance named Dark Matter came under speculation. It is believed this enigmatic substance, of type unknown, accounts for almost t three-quarters of the cosmos within the Universe, could be the answer to several questions raised by the models of the expanding Universe astronomers have created, and even decide the fate of the expansion of the Universe. A great deal of effort has been made since 1687, when Newton introduced the notion of gravity discussing it in terms of forces between ``bodies'' (i.e. visible baryonic objects) stating in the introduction of his ``Philosophiae Naturalis Mathematica'' that ``I have no regard in this place to a medium, if any such there is, that freely pervades the interstices between the parts of bodies''. Since then, the deviations of observed motions from expected trajectories have proved very effective in deepening our understanding of Universe. Whenever anomalies were observed in the motion of planets in the Solar system, the question arose: should such anomalies be regarded as a refutation of gravitation laws or as an indication of the existence of unseen objects? The modern problem of dark matter is conceptually very similar at the old one about unseen planets: we observe in large astrophysical system at all length scales, from galactic to cosmological one, some inconsistencies that can only be explained either by assuming the existence of a large amount of invisible, dark, matter, or by assuming a deviation from the well-known gravitation's laws and the general relativity theory. There is strong observational evidence for the dominance of non-baryonic Dark Matter (DM) over baryonic matter in the Universe.