ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

PHYSICS COLLOQUIUM

Thursday, 14 May 2009
17:00-18:00

3rd Floor Seminar Room

"The Missing Baryons Hunt: a crucial test of our Standard Cosmology and Feedback"

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Abstract

At least 50% of the baryons predicted to exist in the framework of our Lambda-CDM Standard Cosmology paradigm, are unaccounted for in the local Universe, at redshift lower than 2. Assessing this controversial and still open astrophysical puzzle, known as the "Missing Baryons" problem, is of primary importance and has fundamental implications, e.g.: (a) detecting and counting all the baryons in the Universe is the easiest and most practical model- independent way of either confirming or rejecting our Standard Cosmological paradigm, and (b) locating the sites of the missing baryons (H and metals) and measuring their physical status will provide invaluable tools to study the metallicity (galaxy-IGM feedback) and heating (role of shocks in LSS formation) history of the Universe.

All hydrodynamical simulations for the formation of large scale structures run in the framework of a Lambda-CDM Universe agree in predicting that these baryons are concentrated in a tenuous web of hot (shock-heated to temperatures of 1e5-1e7 K) and tenuous (over-densities of ~5-100, compared to the average density of the Universe: 2e-7 cm-3) intergalactic matter (the so called Warm-Hot Intergalactic Medium: WHIM), and they elude detections because too highly ionized to produce visible HI absorption in the optical or UV bands. However, at WHIM temperature highly ionized chemically abundant metal ions (e.g. OVI-VIII, CIV-VI or NV-VII) can still produce residual opacity. Such ions have their primary resonant transitions in the Far-UV (Li-like ions) and soft X-ray (H- and He-like ions), and their hyperfine main transition (H-like ions) in the Radio band. Therefore, the most efficient way of hunting for such baryons is to look for absorption by highly ionized metals against FUV-, X-ray- and Radio-bright background beacons.

After a brief introduction to the problem, I will first review the current, yet controversial, observational evidence of the WHIM and the severe observational limitations due to the still limited performance of the current instrumentation, and will then try to draw a coherent multi-wavelength long-term plan for the near future, to confront, and possibly solve once for all, the Missing baryon problems from all its different, but complementary, sides.