

CASPEN Exit Report

I had the opportunity to visit UCL using funding from the CASPEN exchange programme from 20/06 to 01/07. During my visit, I have made concrete progress on the proposed project which has now reached an advanced phase. The multi-disciplinary nature of the project, at the interface between cosmology and particle theory, allowed me to have interactions and stimulating discussions with various members of the High Energy Physics and Cosmology groups at UCL. I have learned important insights on the cosmological aspect of the project from discussions with Prof. H. Peiris, A. Pontzen, and J. Braden. With my main host, Frank Deppisch, we had daily discussions and interactions on the model-building and phenomenological aspects of the project. All these discussions were valuable and provided clear basis to an upcoming paper (together with Frank Deppisch and a phd student, P. Bolton) on the effects of light dark-sectors (comprising sterile neutrinos) on the CMB in the case of non-standard cosmological histories while taking into account the results of ground-based experiments. During my visit we have identified the key literature relevant for the project, defined the particle physics framework, derived first results on the constraints on secluded dark-sectors from limits on extra-radiation, and determined the most important future steps to be done.

I have also been invited to give the neutrino theory review talk at the “Neutrinos at UCL” workshop, which was well received by the audience. In summary, my visit to UCL allowed me to interact with leading cosmologists and particle physicists and was highly rewarding and fruitful. The visit has led to a concrete project which I am now actively pursuing with my collaborators.

Sincerely,
Sofiane Boucenna
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