“Cold dark matter halo substructure and its role in gamma-ray dark matter searches”

In the standard cosmological model, small dense dark matter (DM) structures, known as halos, form first and later merge to form larger structures. This hierarchical structure formation scenario predicts abundant substructure (or subhalos) inside of larger halos. In this talk, I will discuss the importance that DM subhalos may have for current DM search strategies aimed at detecting a DM annihilation signal in gamma-rays, such as those performed by the NASA Fermi satellite and/or the VERITAS Cherenkov telescopes. On one hand, DM subhalos could be good targets by themselves: the most massive ones are believed to host the observed Milky Way satellite galaxies (which we know are highly DM-dominated and therefore excellent DM candidates), while those with smaller masses, which may host no stars/gas and be thus completely dark satellites, may be also among the best candidates given their distances. On the other hand, since the DM annihilation signal is proportional to the DM density squared, the clumpy distribution of subhalos inside larger halos is expected to boost the DM annihilation flux considerably. I will show that this flux enhancement can only have moderate values in the framework of the concordance cosmology. Yet, it may still modify the DM annihilation flux profiles importantly, especially in galaxy clusters. Some of them might become good DM candidates, competitive with nearby dwarfs, once substructure is properly taken into account.

Miguel Angel Sanchez-Conde, SLAC-KIPAC