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The distribution of Dark Matter particles in the Milky Way and its influence on stars

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Dark Matter (DM) stands for around a quarter of the Universe's energy density and 85% of its mass. However, not much is known about it, from the fact that it weakly interacts through electromagnetic processes, becoming effectively invisible. Nevertheless, many clues point towards its existance. This work builds on this assumption and extends the recent discovery of visible matter being able to trace DM. This is specifically true for old (metal-poor) stars. Then, this work aims to study these stars, relying on the Gaia Satellite Data Release 2, to build connections to DM. This will mainly come in the form of velocity distributions, where the principal focus will be to extract these distributions empirically and draw constraints on the possible DM particle candidates. Different statistics will be used, straying away from the Standard Halo Model, in an attempt to explore different characteristics of this type of matter.

Author: RATO, João (IST)

Presenter: RATO, João (IST)