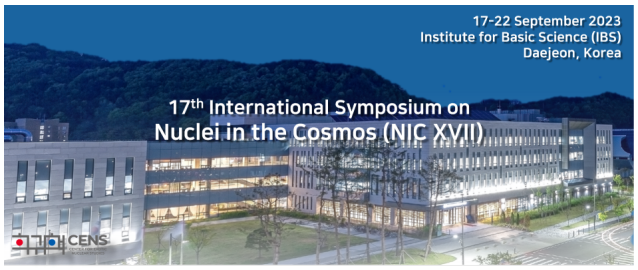

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Lithium in the most iron-poor unevolved stars known and the cosmological lithium problem

Tuesday, 19 September 2023 11:30 (15 minutes)

The most metal-poor low-mass stars formed in the very Early Universe, at about 300 Myr after the Big Bang, are still observable today in the Galactic Halo. These stars hold crucial information of the early epochs of the Universe, such as the properties of the first stars and supernovae and the early chemical evolution of the Universe, and the formation of low-mass stars in the Early Universe.

We identified two very primitive stars, SDSS J0815+4729 and SDSS J0023+0307, using the BOSS survey and follow-up observing campaigns at the 4.2m-WHT and 10.4m-GTC telescopes in La Palma (Aguado et al. 2018a, 2018b; González Hernández et al. 2023). These stars have extremely low iron content (with a [Fe/H] < -5.5) and a unique abundance pattern. The high-quality UVES@8.2m-VLT and HIRES@10m-KeckI spectroscopic data of J0023+0307 (Aguado et al. 2019) and J0815+4729 (González Hernández et al. 2020), respectively, allows us to clearly measure the Li abundance in J0023+0307 at the level of the lithium plateau , whereas in J0815+4729 we are unable to detect Li, thus exacerbating the cosmological lithium problem (González Hernández et al. 2023).

We have also investigated the 6Li/7Li in the most metal-poor spectroscopic binary CS22876-032 using extremely high-resolution (at R~110,000) and high-quality (S/N~580) UVES spectra. CS22876-032, with a metallicity of [Fe/H] ~ -3.7, is about 0.5~dex below the attempts to investigate the 6Li/7Li isotopic ratio in very metal-poor stars from a 3D-NLTE analysis (González Hernández et al. 2019). The lack of evidence of the detection of 6Li has been demonstrated in the re-analysis of some metal-poor stars, using 3D hydrodynamical simulations of metal-poor atmospheres and an appropriate treatment of the Li feature
using 3D-NLTE spectral synthesis (e.g. Steffen et al. 2012; Lind et al. 2013).

In this talk I will show a brief summary of the Li and 6Li/7Li abundances at the
lowest metallicities and the implications and prospects to solve the cosmological Li problem.

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