



Contribution ID: 4

Type: **Poster Presentation**

## Nuclear equation of state modifications from spacetime structure

*Tuesday, 24 March 2026 18:48 (1 minute)*

In the **Kaluza–Klein** model, where one **extra** compactified spatial **dimension** is added to usual spacetime, one can consider **hadronic states** emerging from extra dimensional excitations. These can be associated with e.g., **strangeness** or higher mass states appearing in the nuclear equation of state, with a non-trivial modification to the **speed of sound**, especially in the **conformal limit** [1].

**Macroscopic** neutron star **observables** using a multi-dimensional zero-temperature Fermi-gas equation of state with a linear repulsive potential have been calculated and compared to observational data. A regime for **constraining** extra-dimension sizes based on compact star mass measurements has been determined [2,3]. Microscopic effects of a **strong gravitational field** on the equation of state are investigated [4].

[1] A. Horváth, E. Forgács-Dajka, G.G. Barnaföldi: "Speed of sound in Kaluza-Klein Fermi gas", <https://arxiv.org/abs/2502.04974>

[2] A. Horváth, E. Forgács-Dajka, G.G. Barnaföldi: "Application of Kaluza-Klein Theory in Modeling Compact Stars: Exploring Extra Dimensions", MNRAS, <https://doi.org/10.1093/mnras/> (2024)

[3] A. Horváth, E. Forgács-Dajka, G.G. Barnaföldi: "The effect of multiple extra dimensions on the maximal mass of compact stars in Kaluza-Klein space-time", IJMPA, <https://doi.org/10.1142/> (2025)

[4] A. Horváth, A. Wojnar, G.G. Barnaföldi: "The effects of strong gravity on the dispersion relation of massive particles in the Kaluza–Klein theory", <https://arxiv.org/pdf/2510.16631>

**Authors:** WOJNAR, Aneta (Complutense University of Madrid); HORVATH, Anna (Eötvös Loránd University); FORGÁCS-DAJKA, Emese (Eötvös Loránd University); Dr BARNAFOLDI, Gergely Gabor (HUN-REN Wigner Research Centre for Physics (HU))

**Presenter:** HORVATH, Anna (Eötvös Loránd University)

**Session Classification:** Poster Session