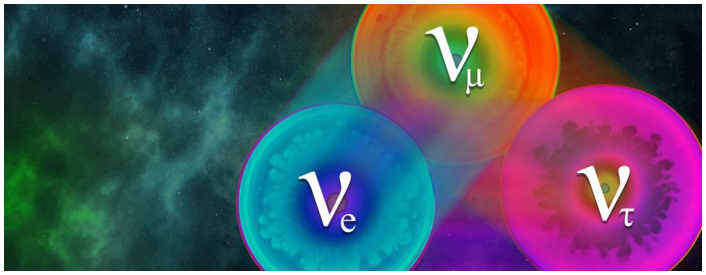

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Exact solutions of Finslerian versions of Einstein's field equations

Wednesday, 21 January 2026 09:30 (35 minutes)

Finsler gravity is a modern extension of Einstein's General Relativity, using Finsler geometry (which generalizes Riemannian geometry) to describe spacetime, allowing for direction-dependent physics, potentially explaining phenomena like dark energy or dark matter, and offering new perspectives on cosmology by studying non-Riemannian "Finsler spacetimes" that still recover Einstein's theory in specific limits, exploring modified gravity theories. Special famous Finsler metrics are (α, β)-metrics. Certain (α, β)-metrics that appear naturally as a spacetime geometry that is compatible with Lorentz symmetry breaking. These metrics, such as generalized m-Kropina metrics (see, [3]), have the potential to be useful in modified gravity and cosmology. As part of my research, I investigate the geometric properties of the generalized m-Kropina metrics, such as the conditions under which they become Einstein-type metrics. As a result, we are able to determine the circumstances under which a generalized m-Kropina metric F becomes an exact solution to either "Chen and Shen's Finslerian non-vacuum field equation" or "Pfeifer and Wohlfarth's vacuum field equation" (see, [1], [2]). Examples of generalized m-Kropina metrics in dimension 4 are presented here. These metrics have significant applications in modified gravity and cosmology. The main results of this talk is contained in [4].

[1] B. Chen and Y. B. Shen, On a class of critical Riemann-Finsler metrics, Publ. Math. Debrecen 72/3-4 (2008) 451-468.
[2] C. Pfeifer and M. N. R. Wohlfarth, Finsler geometric extension of Einstein gravity, Phys. Rev. D 85, 064009, 2012.
[3] C. Pfeifer, S. Heefer and A. Fuster, Identifying Berwald Finsler Geometries, Differential Geom. Appl. 79, 101817 (2021).
[4] Ebtsam H. Taha, "On the generalized m-Kropina metrics", arXiv:2510.22466 [math.DG].

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