EINSTEIN MANIFOLDS WITH OPTICAL GEOMETRIES OF KERR TYPE

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Abstract: We classify the Ricci flat Lorentzian space times with shearfree congruences of null geodesics lifted as $\mathbb{R}^2$-bundles from Riemann surfaces in a special way. We use an ansatz that is motivated by the Kerr and TaubNUT solutions. We obtain two series of solutions related to Kähler Riemann surfaces with positive or negative Gaussian curvature. The positive curvature series contains the rotating Kerr black hole solution.
This is joint work with Masoud Ganji, Cristina Giannotti and Andrea Spiro.
See https://arxiv.org/abs/2405.14760