Ehlers-Kundt conjecture about Gravitational Waves

Miguel Sánchez

Departamento de Geometría y Topología, Univ. Granada.
Facultad de Ciencias, Campus Fuentenueva s/n. E-18071 Granada (Spain)
sanchezm@ugr.es

ABSTRACT

Ehlers-Kundt conjecture asserts that all geodesically complete gravitational pp-waves must be plane waves. Mathematically, it becomes equivalent to a problem on the Euclidean plane $\mathbb{R}^2$ with a very simple formulation in Classical Mechanics: given a non-necessarily autonomous potential $V(z,u)$, $(z,u)\in\mathbb{R}^2\times\mathbb{R}$, harmonic in z (i.e. source-free), the trajectories of its associated dynamical system $\ddot{z}(s)=-\nabla_z V(z(s),s)$ are complete (living eternally) if and only if $V(z,u)$ is a polynomial in z of degree at most 2 (that is, V is a standard mathematical idealization of vacuum). Along the talk, the conjecture will be discussed and solved in the significative case that V is bounded polynomially in z at any $u\in\mathbb{R}$. Based in joint work with J.L. Flores, [1].

References

[1] J.L. Flores, M. Sánchez, *Ehlers-Kundt Conjecture about Gravitational Waves and Dynamical Systems,* arxiv: 1706.03855.