GR20/Amaldi10 — Abstract Book

Local Organising Committee

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Matching of the de Sitter solution and solution for perfect fluid with nonuniform pressure

Korkina M, Iegurnov O

The matching of spherically symmetric de Sitter solution and shear-free solution for perfect fluid with uniform density but with nonuniform pressure was examined. The matching was realized by Lichnerovich-Darmura conditions on the hypersurface \( t = \text{constant} \) (where \( t \) is the time of perfect fluid solution). The conditions of matching on this hypersurface were obtained. From these conditions follows equality of the energy density on the considered hypersurface for both metrics. The fact, that between above solutions exist matching and from the matching conditions follows energy density equality makes combination of these solutions interesting for the constructing cosmological models and models of the physical objects.

The gravitational field of a relativistic sphere of incompressible liquid and "gauge" freedom.

Kozyrev S

We present the new class of relativistic static spherically symmetric configuration of incompressible liquid. This class of configurations is obtained by considering only a spherical arithmetization of manifold. The issue of the physical equivalence between the different coordinate system in Einstein theory is revised. "Gauge" fixing influences results of measurements and physics are different in two different coordinate system. Spacetime metric generated by static spherically symmetric distribution of matter can be matched with wide family of vacuum solution and the exterior spacetime geometry could not be deduced directly from the interior perfect fluid solution, without reference to a "gauge" fixing or vice versa. The property of solutions in general relativity is indeed an observer dependent concept.

Killing vector analysis in ghp formalism of conformally flat pure radiation metrics with negative cosmological constant

Bradley M, Machado Ramos M

In a paper by Edgar and Ludwig it was shown how the symmetry analysis of a spacetime may be considerably simplified when using intrinsic GHP tetrads. A generalised Lie derivative operator, that reduces to the usual Lie derivative when acting on zero-weighted quantities, was introduced. The Killing equations are then obtained by acting with the commutators of this derivative and the GHP operators on zero-weighted scalars (the intrinsic coordinates). In this work we extend the method to a class of spacetimes with null rotation isotropy, where an intrinsic GHP tetrad cannot be completely found. The Killing vectors of the conformally flat pure radiation metrics with negative cosmological constant are then determined and the result is compared with other methods.