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Surprising properties of geometric Dirac observables in General Relativity

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Coordinates adapted to metric tensor are common tool in many areas of General Relativity. From the point of view of canonical framework they provide Dirac observables invariant with respect (ideally) to all or (practically) to most of diffeomorphisms. Recently, in that context the coordinates defined by geodesics emanating from observer were studied. In the case of the space like geodesics the symmetry group is a suitably deformed Poincare group acting on the space of the metric tensor. In the case of the null geodesics the result is surprising for additional reason: the coordinates reduce the diffeomorphism freedom much more than one could expect. Those published as well as very recent results will reported.

[1] Symetria Lorentza i zdeformowana symetria Poincarego w zakrzywionej czasoprzestrzeni, Maciej Kolanowski (Bachelor dissertation)

[2] Observer's observables. Residual diffeomorphisms. Paweł Duch, Jerzy Lewandowski, Jedrzej Świeżewski. Class.Quant.Grav. 34 (2017) no.12, 125009.

[3] The algebra of observables in Gaußian normal spacetime coordinates. Norbert Bodendorfer, Paweł Duch, Jerzy Lewandowski, Jędrzej Świeżewski. JHEP 1601 (2016) 047.

[4] General relativity in the radial gauge: Reduced phase space and canonical structure. Norbert Bodendorfer, Jerzy Lewandowski, Jedrzej Świeżewski. Phys.Rev. D92 (2015) no.8, 084041.

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