Contribution ID: **57**

Type: **parallel**

Vacuum dark energy and spacetime symmetry

Tuesday 13 September 2016 17:00 (25 minutes)

1. Vacuum dark fluid presented by variable cosmological term

[I. Dymnikova, Phys. Lett. B 472 (2000) 33; I. Dymnikova, Class. Quant. Grav. 19 (2002) 725 (Honorable Mention-2001 of the Gravity Research Foundation); I. Dymnikova and E. Galaktionov, Phys. Lett. B 645 (2007) 358; I. Dymnikova, Int. J. Mod. Phys. A 31 (2016) 1641005]

1. Regular Cosmologies with Vacuum Dark Energy

2.1 Regular Lemaitre class models
[I. Dymnikova, A. Dobosz, M. Filchenkov and A.Gromov, Phys. Lett. B 506 (2001) 351;
K. A. Bronnikov, A. Dobosz and I. Dymnikova, Class. Quant. Grav. 20 (2003) 3797;
K. Bronnikov, I. Dymnikova and E. Galaktionov, Class. Quantum Grav. 29 (2012) 095025]

2.2 T-models of the Kantowski-Sachs type with regular pre-bang R-regions
[K. Bronnikov and I. Dymnikova, Class. Quant. Grav. 24 (2007) 5803]

2.3 Cosmological model singled out by the holographic principle
[I. Dymnikova, Int. J. Mod. Phys. D 21 (2012) 124007 (Honorable Mention-2012 of the Gravity Research Foundation)]

1. Regular Compact Objects with vacuum dark energy (de Sitter Vacuum) interiors

3.1 Regular black holes with de Sitter vacuum interior
[I. Dymnikova, Gen. Rel. Grav. 24 (1992) 235 (Awarded by the Gravity Research Foundation in 1991); I. Dymnikova and B. Soltysek, Gen. Rel. Grav. 30 (1997) 1775;
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3.2 Regular black hole remnants, G-lumps and graviatoms
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Phys. Lett. B 685 (2010) 12; I. Dymnikova and M. Korpusik, Entropy 13 (2011) 1967;
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3.3 Mass and spacetime symmetry
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Summary

The Petrov classification of stress-energy tensors provides a model-independent
definition of a vacuum by the algebraic structure of its stress-energy tensor and implies the existence of vacua whose symmetry is reduced as compared with the maximally symmetric
de Sitter vacuum associated with the Einstein cosmological term. This allows one to describe a vacuum in general setting by dynamical vacuum dark fluid, presented by a variable cosmological term with the reduced

symmetry which allows vacuum dark energy be evolving and clustering. The relevant regular solutions to the Einstein equations describe regular cosmological models with time-evolving and spatially inhomogeneous vacuum dark energy, and compact vacuum objects generically
related to a dark energy via de Sitter vacuum interiors: regular black holes, their remnants and self-gravitating vacuum solitons - which can be responsible for observational effects typically related to a dark matter. The mass of objects with the de Sitter interior is generically related to breaking of space-time symmetry from the de Sitter group in the origin.

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Session Classification: [DE] Dark energy