

## Belinski Vladimir

Position: ICRANet, Faculty Member

Period covered: December 2014 -December 2015



### I Scientific Work

1. In 2014 ICRANet started the new program “Exact solutions in the super-symmetric General Relativity” in collaboration with the group of Prof. Hermann Nicolai at Albert Einstein Institute at Potsdam (Germany). This new direction is now in the list of the thematic of the ICRANet sector “Exact Solutions of the Einstein and Einstein-Maxwell equations”. The foremost target is construction of the exact solutions for super-gravitational solitons. During 2014-2015 the work have been dedicated to the extension of the generating technique known as the Inverse Scattering Method (ISM) to the super-gravity. Here we have two main problems: first to formulate the super-symmetric version of ISM for the two-dimensional integrable models in super-gravity and then to find a way to construct exact super-solitonic solutions. During this year both of these problems was solved for the 2-dimensional extended  $N=2$  super-gravity and corresponding paper have been published in Physical Review D, reference [1].

2. A paper on the influence of the shear viscosity (in the framework of Israel-Stewart non-equilibrium thermodynamics) on the character of the cosmological singularity has been published, see reference [2]. The results confirm the previous author's statement on the existence of some types of viscous matter which are able to generate the stable Friedman-like initial cosmological singularity without any fine tuning.

3. The work on the book "Cosmological Singularity" (V.Belinski and M.Henneaux) has been continued. The project is in progress under the agreement with Cambridge University Press. This year was dedicated to the chapter "Oscillatory singularity in String models" and to few sections dedicated to the influence of different kinds of matter on the character of the singularity.

### II Conferences and educational activities

#### *Conferences:*

- 1) 14th Marcel Grossmann Meeting, July 2015. I served as chairman of the "Quantum Fields" parallel session.
- 2) 14th Italian-Korean Meeting, July 2015, Rome. The talk: V. Belinski "Integrable Super-Gravity models".

### 2015 List of Publication

- [1] V. Belinski "Supergravitational Solitons", Phys. Rev. **D91**, 125041 (2015).
- [2] V. Belinski "The generic solution with isotropic Big Bang", Astronomy Reports (Springer), **59**, 425 (2015).