

## Geometric analysis on hyperhermitian manifolds

The broad goal of the project is to use the tools from the theory of partial differential equations and analysis to study the geometric properties of certain manifolds - objects of interest in differential geometry and mathematical physics. More precisely I will conduct the research on manifolds endowed with connections having torsion and special holonomy. This corresponds to considering specific, in our situation super-symmetric, model of the universe. These structures appear naturally for example in string theory - one of the modern theories of mathematical physics trying to build a mathematical model for the universe and forces acting in it. The main research task will be to solve the so called quaternionic Calabi conjecture on the existence of canonical metric on the manifolds with the structure described above. This can be seen as an analogue of the Calabi-Yau theorem which provided many examples of models for string physicist believing the universe being, at least locally, of the form four dimensional spacetime times six dimensional, complex three dimensional, Calabi-Yau space.