The general theory of relativity and its applications in astrophysics and cosmology is a field that has been taught and pursued at the FMP CU systematically since the 1970s and its advancement has been associated primarily with the Institute of Theoretical Physics and the name of Prof. Jiří Bičák. A number of researchers still active in the field today – working not only at the FMP CU but also at other universities and institutes of the Academy of Sciences of the Czech Republic, ASCR—began their professional carriers under his supervision. The research profile encompasses mainly mathematical problems of general relativity and its higher-dimensional versions, particularly the search for and interpretation of exact solutions of Einstein’s equations, investigation of spacetimes involving gravitational radiation, formulation of conservation laws and their relation to various types of symmetries, physics of black holes and of massive discs as gravitational sources, behaviour of particles and fields in curved spacetimes, the issue of cosmological perturbations, and, more recently, also the application of computers to non-stationary problems involving very strong fields (the so-called numerical relativity), approximation methods in theories of gravitation, non-homogeneous cosmological models, and gravitational lenses. The group continues educating students in the fields of relativistic physics and methods based on differential geometry. It has extensive international contacts and has completed successfully a number of grant projects. Currently, its operation is supported particularly by Albert Einstein Center for Gravitation and Astrophysics, a Project of Excellence awarded by the Czech Science Foundation. Within the Center, the group has also enhanced its collaboration with colleagues from the Astronomical Institute of the ASCR, the Institute of Mathematics of the ASCR, and from Silesian University in Opava.

Selected outputs

- Ortaggio M., Podolský J., Žofka M., Static and radiating p-form black holes in the higher dimensional Robinson-Trautman class, Journal of High Energy Physics (2015) id.45 (39 pp.)
- Barker W., Ledvinka T., Lynden-Bell D., Bičák J., Rotation of inertial frames by angular momentum of matter and waves, Classical and Quantum Gravity 34 (2017) id.205006 (16 pp.)