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## KOLOKVIJ FIZIČKOG ODSJEKA

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*Kolokvij će se održati u spomen na Prof. Dubravka Tadića.*

### Quantum fields under extreme conditions in compact stars, heavy-ion collisions and lasers

**Prof. Dr. David Blaschke**

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The exploration of matter under the extreme conditions of densities, temperatures, and strong fields is a challenging task for theory as well as experimental research since it allows to test our concepts of phase transitions and mechanisms for the creation of matter from the vacuum. I will characterise the present status of the search for the quark-gluon plasma in heavy-ion collisions at CERN-SPS and RHIC and in the interiors of compact stars. A rather detailed picture of the phase diagram of QCD is emerging with similarities to other strongly correlated systems in nature, where superconductivity and superfluidity occur. The project of a new accelerator complex at GSI Darmstadt (FAIR) may provide ideal conditions for the exploration of these aspects including the question for the critical point in the QCD phase diagram. For the studies of fundamental aspect such as particle creation from the vacuum in strong external fields (Schwinger mechanism) future Exawatt and Zetawatt lasers, planned within a new European Extreme Light Infrastructure are providing necessary critical intensities. The creation of the quark-gluon plasma using laser accelerators is one of the options for the future.

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