

Particles & Plasmas 2025

Görlitz or Dresden, Germany

David Blaschke (IFT UWr, HZDR/CASUS)



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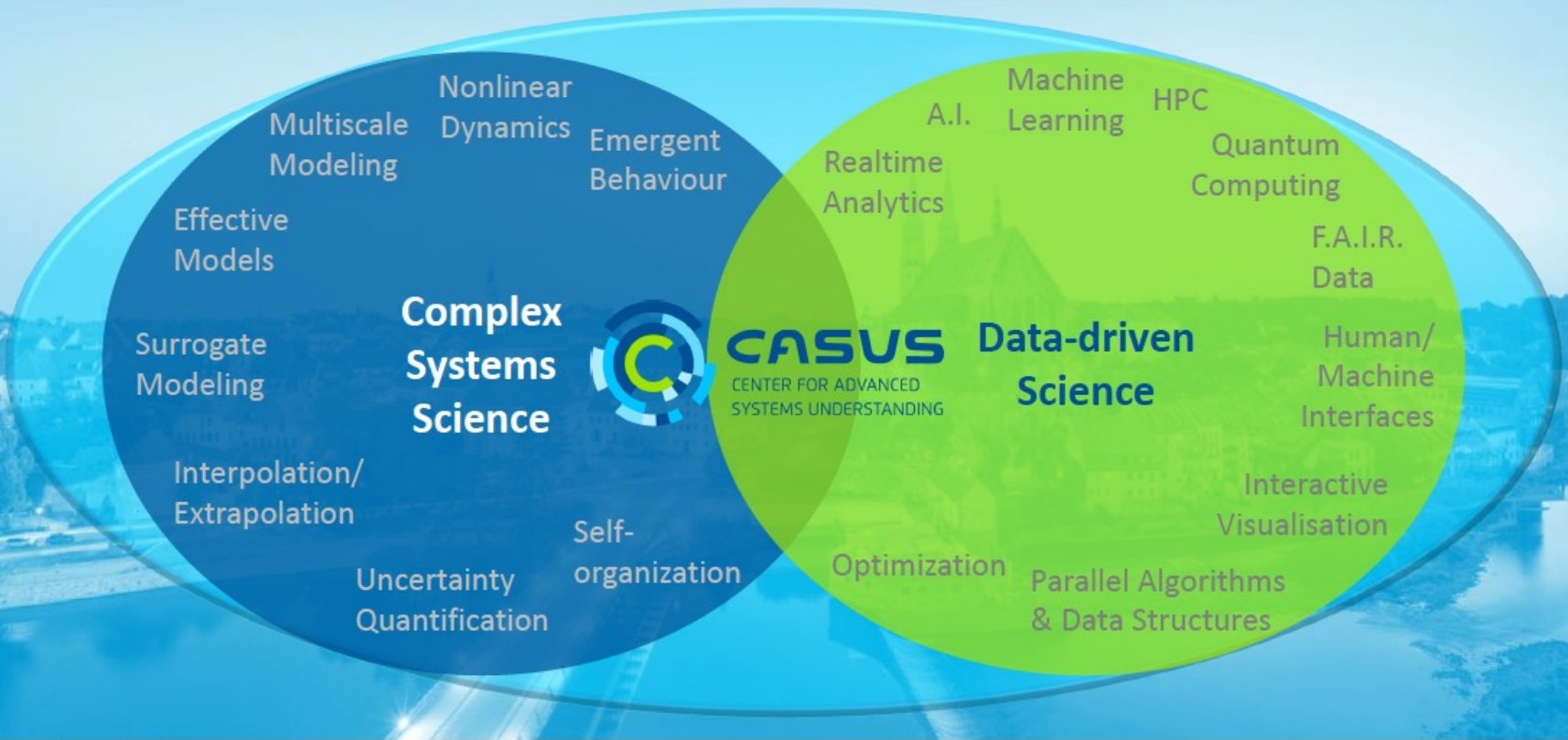
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Dr. Michael Bussmann: Computational Radiation Physics

<https://www.casus.science/research-areas/computational-radiation-physics/>

Dr. Attila Cangi: Machine Learning for Materials Design

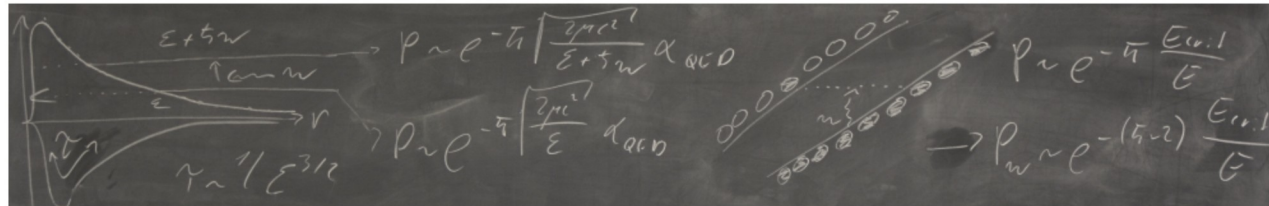
<https://www.casus.science/research-areas/machine-learning-for-materials-design/>

Dr. Tobias Dornheim: frontiers of Computational Quantum Many-Body Theory

<https://www.casus.science/research-areas/frontiers-of-computational-quantum-many-body-theory/>

Institutes

Institute of Theoretical Physics

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Institute of Theoretical Physics

Scientific Profile

Non-equilibrium phenomena lead to many fascinating effects in various areas of physics. Often one finds astonishing parallels between quite different disciplines: For example, ultra-cold atoms or ions in traps display very similar mechanisms to electrons and phonons in solids. Further parallels exist between the creation of electron-positron pairs in extremely strong laser fields (so far only a prediction) and other effects such as nuclear fusion or the dielectric break-down in semi-conductor diodes. On a completely different scale, effects in extreme environments, such as around black hole or in the early universe, do also display interesting analogies to laboratory systems, e.g., ultra-cold atoms or ions in traps.

In the Institute of Theoretical Physics at HZDR, such non-equilibrium phenomena are investigated by predominantly analytical means. Key aspects include strong-field physics (in collaboration with the Institute of Radiation Physics), the fascinating properties of the promising material graphene (in collaboration with the Institute of Ion Beam Physics and Materials Research), as well as strongly correlated systems (which provides a link to the Dresden High Magnetic Field Laboratory).

Contact

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▶ Faculty of Physics TU
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▶ HI Jena

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Institute of Radiation Physics

Scientific profile and research program

The Institute of Radiation Physics conducts research for states of matter under extreme conditions and in very small dimensions. In order to investigate fundamental physical phenomena, state-of-the-art radiation sources are used. Therefore, the establishment of novel accelerators and the further development and improvement of existing machines is an essential goal of the institute. High-power lasers allow the investigation of the interactions of light and matter. For the detection of the effects on the smallest scales, high-precision and very fast detectors are developed and applied. The use of the latest high-performance GPU computing technology assures real-time handling of big data and sets world-wide standards for open-source simulation tools for complex systems.

In addition to basic research, the application of technologies is a key issue. In modern radiation therapy, developments from our institute are used. The research is embedded in the research topics "Matter" and "Health" of the Helmholtz Association.

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Polish-German WE-Heraeus Seminar & Max Born Symposium:



03.12.
06.12.
2023

Many-particle systems
under extreme conditions



<https://events.hifis.net/event/1076>



Proposal: “Particles & Plasmas 2025” as Hungarian-German WE-Heraeus Seminar



Possible Venue: Kulturforum Synagogue Görlitz, June 2025
Co-organizers: T. Biró, D. Blaschke, R. Schützhold

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