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# Predictive modeling of experiments on matter under extreme conditions

High power lasers and X-ray free electron lasers enable experiments on matter under extreme conditions at atomistic resolutions. A singfle high power laser impinging on a solid density target creates a plasma spanning orders of magnitude in density and temperature.

In this talk we present a view on how better physics modeling and understanding can be combined with Exascale computing and machine learning to create a research program integrating experimental discovery with predictive modeling.

**Primary author:** BUSSMANN, Michael (HZDR)

**Co-authors:** DEBUS, Alexander (Helmholtz-Zentrum Dresden-Rossendorf); WILLMANN, Anna; Dr CANGI, Attila (Helmholtz-Zentrum Dresden-Rossendorf, Center for Advanced Systems Understanding); MARRE, Brian Edward (HZDR Laser Particle Acceleration/Computational Radiation Physics); CARSTENS, Finn-Ole (HZDR (Helmholtz-Zentrum Dresden - Rossendorf e. V.)); POESCHEL, Franz (CASUS/HZDR); VORBERGER, Jan (HZDR); KELLING, Jeffrey (HZDR); STEINIGER, Klaus (CASUS - Center for Advanced Systems Understanding, Helmholtz-Zentrum Dresden-Rossendorf); ORDYNA, Pawel; WIDERA, Rene (HZDR –Helmholtz-Zentrum Dresden-Rossendorf); KLUGE, Thomas (HZDR); DORNHEIM, Tobias (CASUS / HZDR); Dr HERNANDEZ ACOSTA, Uwe (Center for Advanced Systems Understanding)

**Presenter:** BUSSMANN, Michael (HZDR)

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