

## **Contribution submission to the conference SKM 2023**

**Excitation-induced non-thermal effects in silicon** — ●SIMON KÜMMEL, DOMINIC KLEIN, and JOHANNES ROTH — FMQ University of Stuttgart, Germany

Ultra-fast laser excitation of silicon leads to highly non-linear, non-equilibrium effects in covalent materials. Especially the non-thermal melting in covalent materials like silicon has been observed in experiments. A rigorous explanation in the context of the induced macroscopic material dynamics during laser ablation is still missing. Here, we present novel results from laser ablation simulations taking this effect into account via an electron temperature-dependent interaction potential. We report non-thermal surface evaporation and pre-shockwave melting comparable to experimental investigations. Furthermore, we give more insight into non-thermal melting from electron temperature-dependent phase diagrams obtained from thermodynamic integration of the same electron temperature-dependent interaction potential.

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