



## Workshop Radiotherapy & Mathematics

**Title:** On the use of transport equations for dose calculation and planning optimization

**Speaker:** Martin Frank

**Summary:** Dose calculation using a Boltzmann transport equation has only recently attracted attention in the medical physics community. Similar to Monte Carlo simulations, this access relies on a rigorous model of the physical interactions in human tissue that can in principle be solved exactly.

Monte Carlo simulations are widely used, but it has been argued that a grid-based Boltzmann solution should have the same computational complexity. In addition, transport equation models have two advantages: Reduced models can be derived in a systematic manner, and analytical expressions for gradient can be obtained, which is useful for optimization.

We present recent advances in the modeling of dose calculation and treatment plan optimization using transport equations and reduced models.