Module name	**Particle Methods**
Module number	CMS-TRK-PM
Senior Lecturer	Prof. Dr. Ivo Sbalzarini ivo.sbalzarini@tu-dresden.de
Qualification objectives	Students master the basics of the algorithm class of particle methods. They can implement and use particle methods independently, for both discrete and continuous model simulations. They are familiar with the mathematical and numerical bases of particle methods and are able to translate them into computer programs using efficient data structures.
Contents	The content of the module shall include particle methods for discrete systems, particle methods for continuous systems, time integration procedures for particle methods, efficient data structures for particle methods, efficient proximity search, discretisation of medium particle differential operators, and hybrid particle grid methods.
Forms of teaching and learning	The module includes lectures of 2 SWS, exercises of 2 SWS and self-study. The language of the lectures and exercises will be English.
Eligibility for participation	Knowledge of programming in a computer language, such as python, knowledge of analysis and vector analysis at bachelor's level, and knowledge of physics at proficiency level.
Usability	In the Computational Modeling and Simulation Masters Course, the module is an optional module in Track Computational Life Science and Track Computational Engineering, to be selected in accordance with Annex 2 to the Specific Examination Regulations. The module cannot be chosen in the Master's Course Computational Modeling and Simulation if this or a module with substantially the same content from a Course with which the entry conditions under § 3 of the Studienordnung have been met has already been completed. The module provides the pre-requisites for the modules it designates under the pre-requisites for participation.
Conditions for the award of credits	Credits are awarded when the module test is passed. The module test consists of a 90-minute away day. The language of the test will be English.
Credits and marks	The module allows 5 credit points to be obtained. The module score corresponds to the test performance score.
Frequency of the module	The module is offered every summer semester.
Workload	The total workload is 150 hours.
Duration of the module	The module covers 1 semester.