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Smoothed Particle Hydrodynamics and its application in Quantum Mechanics

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April 21, 2015 at 11:30 in T115C

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Abstract: Smoothed particle hydrodynamics (SPH) is a meshless numerical method designed for solving partial differential equations of fluid dynamics. In this talk we will briefly review the history of the method which began in 1977 with an article of Gingold and Monaghan on astrophysical simulations. Then we will describe key ingredients and main principles of the method (in particular kernel smoothing and moving weighted least squares method). Important differences to traditional grid based methods (like FEM and FDM) will also be mentioned. In the second part of the talk, we will review the so called hydrodynamical formulation of quantum mechanics and show how the SPH method can be applied to various one-dimensional quantum mechanical problems.