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Application of Graphics Processing Units to Newtonian stellar dynamics

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Newtonian stellar dynamics is traditionally on the forefront of high-performance computing: it required a dedicated Newtonian solver to study the stability of the solar system, and a special purpose GRAPE hardware to understand the dynamics of dense stellar system. Emergence of general-purpose computations on Graphics Processing Units (GPGPU) have opened new and exciting opportunities in computational stellar dynamics. A wide range of advanced algorithms which compute Newtonian gravitational force, ranging from the direct summation to sophisticated fast-multipole methods, have been successfully implemented on graphics processing units, and their performance eclipse that of special purpose hardware. In this contribution I will talk about GPGPU and why it has become an excellent computational tool for stellar dynamics.