The Universe in a Computer:
How Mathematical and Numerical Methods Are Essential

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Abstract: We will talk about our contribution to a large project with the goal of a self-consistent numerical simulation of the evolution of the universe beginning soon after the Big Bang and ending with the formation of realistic stellar systems like the Milky Way. This is a multi-scale problem of vast proportions. It requires the development of new numerical methods that excel in accuracy, parallel scalability to the processes relevant in galaxy formation. These numerical methods themselves require the development of mathematical theory in order to guarantee the above mentioned requirements. In this talk we shall focus on our contribution to this effort.

This is joint work among others with Volker Springel.

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