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Computational Astrophysics in Italy: methods and tools

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Osservatorio Astronomico e Dip. di Astronomia dell'Universitá di Bologna e
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Bologna e Casalecchio di Reno (Bo), Italy, July 4-5, 2002

EDITED BY

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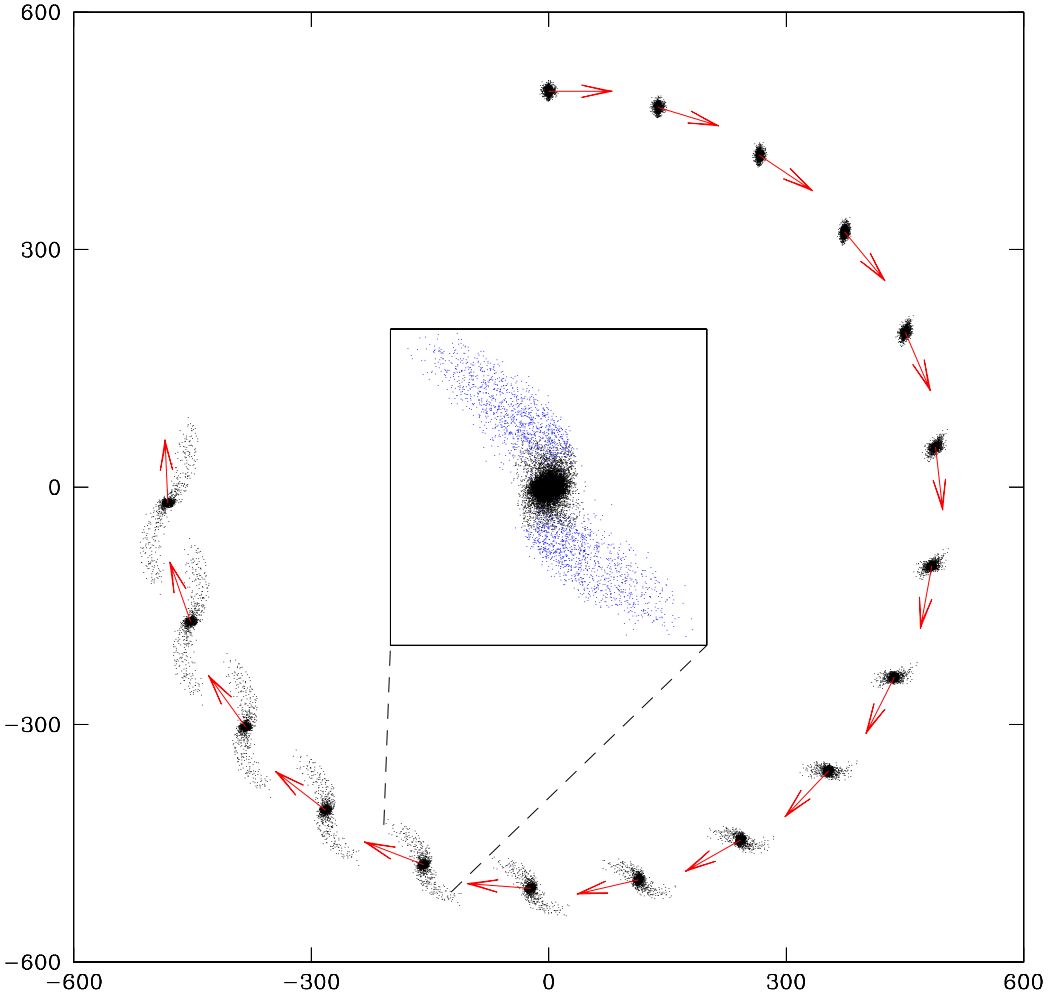

Fig. 1. An example of astrophysical supercomputing: the N-body simulation of the tidal deformation of a 3×10^5 $M_\odot$ globular cluster moving in a circular orbit of radius 500 pc around the centre of a triaxial galaxy. The inner box is a zoom of one of the cluster configurations; in blue colour the stars tidally stripped. (courtesy of Capuzzo Dolcetta, Di Matteo and Miocchi; computations performed with the ORIGIN system at CINECA in the framework of the INAF-CINECA agreement).

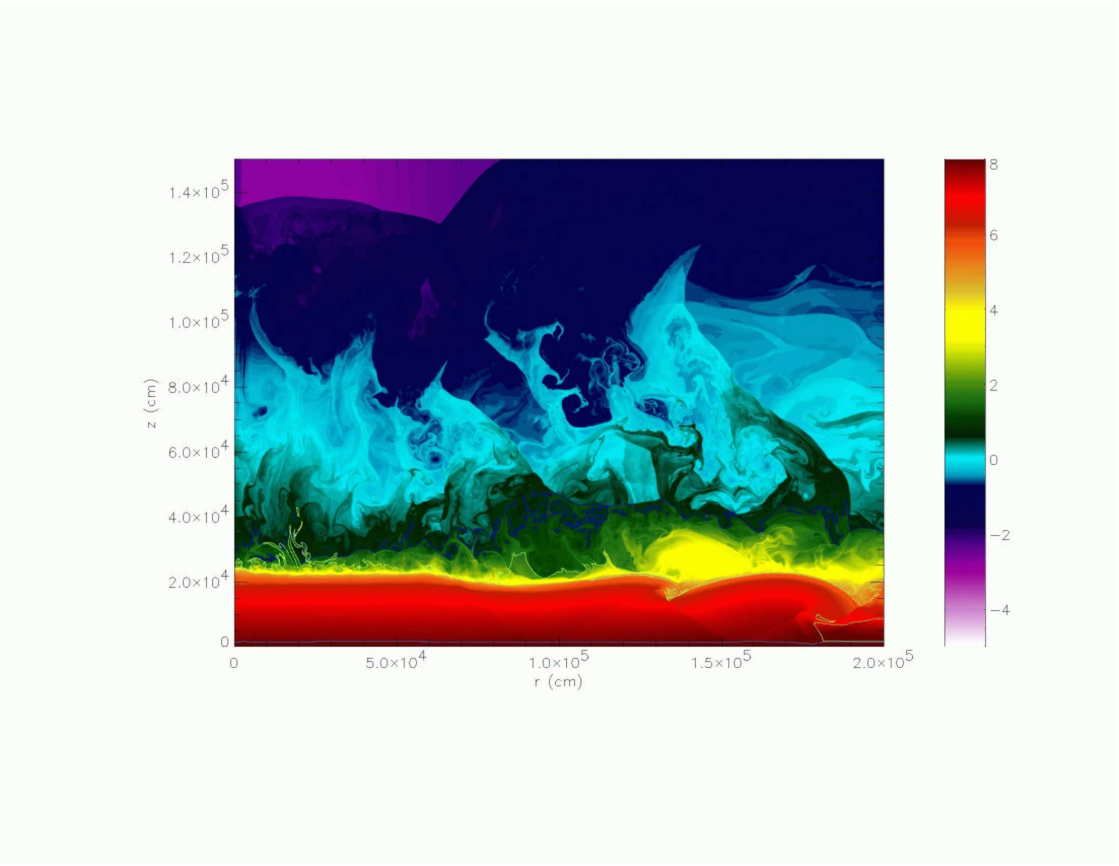

Fig. 2. Another example of results of astrophysical supercomputing, obtained by mean of the FLASH code:the helium detonation on the surface of a neutron star after 150 microseconds from the burst. The vertical axis extends through the accreted envelope, to a height of 1.5 km. The horizontal axis is a 2 km portion along the surface of the neutron star. The density plot spans 13 orders of magnitude, from the dense material at the base of the envelope (10^8 g/cm^3, dark red colour) to the fluff, with a density of 10^{-5} g/cm^3 (white) (from Zingale et al., 2001, ApJS, 133, 195).

FOREWORD

On behalf of the Scientific Organizing Committee I want, first of all, to thank people of the Local Organizing Committee who helped us in the organization of this first meeting devoted to Computational Astrophysics in Italy. In particular, I thank P. Miocchi for his contribute to the general organization and C. Gheller and P. Londrillo for their fundamental links with CINECA and the Observatory and the Department of Astronomy of the University of Bologna, sites of this 2-day meeting. Of course, a warmful thank is due to these three institutions and their directors, as well as to INAF and the Dep. of Physics of the University of Roma La Sapienza, that financially contributed to the positive realization of this meeting.

I am happy for the participation of many young people, to witness that astrophysics and, in particular, the field of highly sophisticated astrophysical modelization is appealing for the young and active researchers.

Everybody knows that Italy, better to say italian scientists, is at a level of international excellence in various branch of science among which, undoubtely, astronomy and astrophysics is at one of the first ranks. Actually, Italy is joining to various international observational projects, giving to many of them project a fundamental contribution both financial and, mainly, in the form of know-how and human resources. So, in spite of our heavy burocratical structures and of objective difficulties in obtaining funds for science, observational astronomy and astrophysics has been florishing in Italy for many years. Unfortunately, we cannot say the same about theoretical astrophysics. In the most scientifically advanced countries the developement of experimental science is always accompanied by a corresponding increasing interest, and relative financing!, in the theoretical interpretation of the experimental and observational results which, nowadays, depends more and more by numerical modelizations of complex phenomena.

I do not see in Italy such an equilibrium about observational and theoretical efforts and relative investments. The recent agreement between INAF and CINECA makes available to the high performance computing italian community an ammount of resources that corresponds to a quantity of money that is, in spite of the different opinion of many of our colleagues, negligible respect to the amount spent in observational ground and space projects. Because it is quite clear that the progress of science needs a careful accomplishment of the step of theoretical interpretation (otherwise, the amount of data that is increasing enourmously will be, eventually, almost useless) I think that we must agree on requiring to reach as soon as possible the told equilibrium as it already happens in highlyscientifically developed countries. If not, we will not be competitive as we wish.

In this framework, this meeting is, in our aims, useful to check the level of the italian computational astrophysics community, other than to evaluate its quantitative (in the sense of quantity of people involved) relevance. I stress that we can convince the overall national scientific community of the fundamental role of theory and simulations just if we reach, firstly, the goal to be able to communicate scientific results one each other in the most efficient way. This goal may be reached just through moments like this meeting.

Consequently, I conclude expressing my wish that this meeting will not remain isolated but represents the first of a series that will allow our community to grow in a synergic way.

For the Organizing Committee
Roberto Capuzzo Dolcetta

People invited to the round table on the state of computational astrophysics in Italy

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