Curriculum vitae

Mario Pasquato

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Work experience

Marie Skłodowska-Curie fellow - Astrofit @ OAPD/INAF Italy, Sept. 2017-
Using artificial intelligence to find intermediate-mass black holes in globular clusters (ARTificial Intelligence Search for Intermediate-mass black holes in star Clusters - project *ARTIStIC*).

Postdoctoral fellow - Yonsei University Korea, Oct. 2012 - Jun. 2017
Developed my own computational astronomy research program with a focus on star-cluster dynamics and intermediate-mass black holes. Planned, run and analyzed large sets of direct N-body simulations (with the NBODY6 code on GPUs). Supervised two graduate students. Taught a semester course in computational astronomy, with my own materials and tests. Ongoing international collaborations with groups in the US (Prof. Strader at Michigan State University), Italy (Prof. Ferraro and Lanzoni at University of Bologna, Prof. Mapelli at INAF), Taiwan (Prof. Taam at ASIAA), and Poland (Prof. Giersz at the N. Copernicus Center for Astronomy).
During this period I have eight refereed publications, and four invited seminars.

Postdoctoral researcher - University of Bologna Italy, Jul. 2011 - 2012
Performed the simulation groundwork for Ferraro et al. 2012, a Nature paper that constrained the formation mechanism of blue straggler stars in GCs by reproducing their bimodal radial distribution with a pure mass-transfer BSS population undergoing mass-segregation.

Visiting researcher - European Space Agency The Netherlands, Jun.-Jul. 2009
Obtained globular cluster observations. Used them to test my mass-segregation method for finding intermediate-mass black holes in globular clusters. Expenses covered by ESA.

Summer intern - Space Telescope Science Institute Jun. - Aug. 2008
Developed a new method for finding intermediate-mass black holes in globular clusters. As a result, published two refereed papers, ruling out an IMBH in M10 and NGC 2298.

Other

In Jan. 2011 I incorporated a one-person enterprise in Pisa, Italy. I continued working as a tutor and freelance statistical consultant to businesses throughout my first postdoc at Bologna University. From Sept. to Dec. 2009 I was a teaching assistant (*cultore della materia*) at the University of Pisa, with duties including grading tests and managing the analog electronics lab for undergraduates. From Apr. to Jun. 2007 I took part in an outreach program of the University of Pisa as a guide in a hands-on science museum.

Grants, awards and achievements

Was awarded grant N. 2017018587 by the National Research Foundation (NRF) of Korea for project *머신러닝을 응용한 중간질량 블랙홀 찾기* (Machine-learning search for

intermediate-mass black holes). The grant amounted to 250'000'000 Korean Won (about 200'000 euros) over a period of 3 years. Declined.

Member of the technical-scientific committee of the Italian Embassy in Korea, with duties including evaluating researcher applications for mobility grants, judging the quality, novelty and implications of their research proposals.

PI of an Italian Super Computing Resource Allocation C-class project awarded fifty thousand core-hours of computational time on CINECA supercomputers (Bologna, 2011)

Education

Ph.D., Astrophysics - Pisa University Italy, Dec. 2010
Full, merit-based scholarship and tuition waiver. Thesis: *Globular clusters and intermediate-mass black holes: a model-free, non-parametric approach, between simulations and observations* - Advisor: Prof. G. Bertin (University of Milan)

M.Sc., Physics - Scuola Normale Superiore Italy, Sept. 2007, summa cum laude

M.Sc., Astrophysics - Pisa University Italy, Sept. 2006, 110/110
Thesis: *the fundamental manifold of globular clusters* - Advisor: Prof. G. Bertin (University of Milan)

B.Sc., Physics - Pisa University Italy, Oct. 2004 110/110
Thesis: *Stochastic resonance and its applications to biology* - Advisor: Prof. R. Mannella (Pisa University)

Skills and assets

Codes for star-cluster dynamics: NBODY 6 and MOCCA (I have access to the source code and to the BigSurvey library of simulations through my collaboration with Prof. Giersz). Planning and deploying large simulations, including on GPU clusters, using the relevant Unix/GNU- Linux and HPC tools (shell scripting, schedulers, performance monitors...). Writing, debugging and optimizing R scripts for data processing, model fitting, plotting, and visualization. I am fluent in R and its most popular libraries, particularly in machine-learning techniques such as support vector machines (*e1071* library in R), trees (*C5.0, randomForest, PARTY, rpart*) cluster analysis (*cluster*). Deep learning using the *H2O* library. I applied my knowledge of machine-learning to diverse problems within the kaggle.com competition platform with results in the top 10% of participant achievements. Working knowledge of Python (including Jupyter notebooks), C, SQL (can interface R and PostgreSQL using the RPostgreSQL library). Version control with git/github. LaTeX and BibTeX. Good knowledge of Tableau and Rapidminer.

Able to communicate scientific results in fluent English, both in written form and orally. Native speaker of Italian, fluent in English, working knowledge of Korean, German and Ukrainian. Recipient of a scholarship from the Confucius Institute for receiving an immersive course of Mandarin Chinese in Nankai University, Tianjin, China (summer 2011). Public speaking. Teamwork. Large network of collaborations. Ready to adapt to different cultural environments. Eager to travel and interact with the scientific community worldwide.