

## CURRICULUM VITAE ET STUDIORUM

### GIUSEPPE MURANTE

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**Place/date of birth:** Torino, 6 Gennaio 1967

**Current position:** Researcher in Astronomy at INAF-Osservatorio Astronomico di Torino

**Education:** Graduated in 1991, with the thesis “*Modelli Frattali della distribuzione a grande scala di galassie*”, supervisor: C. Castagnoli. Ph.D. in 1991, with the thesis “*Dinamica del clustering gravitazionale non lineare*”, supervisor: C. Castagnoli.

Fellowships at IAP (Paris), UAM (Madrid); post-doc at Milano University (Prof. Bonometto). Staff position at OATo since 2001.

#### **Research interests:**

My field of scientific interest concerns the theory of formation and evolution of cosmic structures, galaxies and galaxy clusters.

I am particularly interested in the non-linear regime of the evolution, which requires the use of numerical techniques to be theoretically characterized, and studied the statistical properties of a collisionless self-gravitating fluid in a non-cosmological scale-free context.

Later on, I studied the statistical properties of the Dark Matter (DM) distribution in various cosmological models.

Finally, I focused on the formation and evolution of baryonic structures, analysing the physical and thermodynamical properties of the hot diffuse gas [4,12,15,20,21,23,25,26,27,28,29,30,32] and the properties of galaxies [6,7,9,17,19]

and of the diffuse stellar component [3,13,16,31] in galaxy clusters. I was co-relator of a Laurea thesis on the latter subject.

I also worked, from the theoretical point of view, on the problems of angular momentum loss during the formation of disk galaxies [18], of the onset and evolution of bar instabilities [5,11,14,22], of the formation of a counter-rotating outer stellar halo [1], and on the chemical properties of disk galaxies in a cosmological context[8,10].

During last years, I worked on the development and the implementation of a new model (MUlti-Phase Particle Integrator, MUPPI) for star formation and feedback in the cosmological numerical code GADGET [2]. I was co-relator of a Ph.D. thesis on this subject.

Currently, I am applying MUPPI to the problem of the formation and evolution of disk galaxies in a cosmological context, together with the Trieste numerical cosmology group (Stefano Borgani, Pierluigi Monaco, Gabriella De Lucia, Luca Tornatore).

From the technical point of view, almost all of my work was based on numerical N-Body simulations. I routinely use parallel N-Body codes and N-Body+SPH codes on large supercomputers.

**Technical skills:**

Programming languages: C, FORTRAN

Parallel programming: MPI

Operative systems: several unix flavours, linux, windows

**Refereed publications (last 5 years):**

1. Murante, G., Poglio, E., Curir, A., Villalobos, A., “*Assembly of the Outer Galactic Stellar Halo in the Hierarchical Model*”, 2010, ApJL, 716, 115
2. Murante, G., Monaco, P., Giovalli, M., Borgani, S., Diaferio, A., “*A subresolution multiphase interstellar medium model of star formation and supernova energy feedback*”, 2010, MNRAS, in press
3. Dolag, K., Murante, G., Borgani, S., “*Dynamical difference between the cD galaxy and the stellar diffuse component in simulated galaxy clusters*”, 2010, MNRAS, in press

4. Fabjan, D., Borgani, S., Tornatore, L., Saro, A., Murante, G., Dolag, K., ‘ “*Simulating the effect of active galactic nuclei feedback on the metal enrichment of galaxy clusters*”, 2010, MNRAS, 401, 1670
5. Curir, A., de Romeri, V., Murante, G., “*Evolution and instabilities of disks harboring super massive black holes*”, 2010, Ap&SS, 327, 259
6. Dolag, K., Borgani, S., Murante, G., Springel, V., “*Substructures in hydrodynamical cluster simulations*”, 2009, MNRAS, 399, 497
7. Doherty, M., Arnaboldi, M., Das, P., Gerhard, O., Aguerri, J. A. L., Ciardullo, R., Feldmeier, J. J., Freeman, K. C., Jacoby, G. H., Murante, G., “*The edge of the  $M 87$  halo and the kinematics of the diffuse light in the Virgo cluster core*”, 2009, A&A, 502, 771
8. Colavitti, E., Cescutti, G., Matteucci, F., Murante, G., “*The origin of abundance gradients in the Milky Way: the predictions of different models* “, 2009, A&A, 496, 429
9. Saro A., Borgani S., Tornatore L., De Lucia G., Dolag K., Murante G., “*Simulating the formation of a protocluster at  $z \approx 2$* ”, 2009, MNRAS, 392, 795
10. Colavitti E., Matteucci F., Murante G., “*The chemical evolution of a Milky Way-like galaxy: the importance of a cosmologically motivated infall law*”, 2008, A&A, 483, 401
11. Curir A., Mazzei P., Murante G., “*Star formation and bar instability in cosmological halos*”, 2008, A&A, 481, 651
12. Viola M., Monaco P., Borgani S., Murante G., Tornatore L., “*How does gas cool in dark matter haloes?*”, 2008, MNRAS, 383, 777
13. Murante G., Giovali M., Gerhard O., Arnaboldi M., Borgani S., Dolag K., “*The importance of mergers for the origin of intracluster stars in cosmological simulations of galaxy clusters*”, 2007, MNRAS, 377, 2
14. Curir A., Mazzei P., Murante G., “*Evolution of stellar-gaseous disks in cosmological halos*”, 2007, A&A, 467, 509

15. Roncarelli M., Ettori S., Dolag K., Moscardini L., Borgani S., Murante G., “*Simulated X-ray galaxy clusters at the virial radius: Slopes of the gas density, temperature and surface brightness profiles*”, 2006, MNRAS, 373, 1339
16. Monaco P., Murante G., Borgani S., Fontanot F., “*Diffuse Stellar Component in Galaxy Clusters and the Evolution of the Most Massive Galaxies at  $z < \approx 1$* ”, 2006, ApJ, 652, L89
17. Saro A., Borgani S., Tornatore L., Dolag K., Murante G., Biviano A., Calura F., Charlot S., “*Properties of the galaxy population in hydrodynamical simulations of clusters*”, 2006, MNRAS, 373, 397
18. D’Onghia E., Burkert A., Murante G., Khochfar S., “*How galaxies lose their angular momentum*”, 2006, MNRAS, 372, 1525
19. Biviano A., Murante G., Borgani S., Diaferio A., Dolag K., Girardi M., “*On the efficiency and reliability of cluster mass estimates based on member galaxies*” 2006, A&A, 456, 23
20. Roncarelli M., Moscardini L., Tozzi P., Borgani S., Cheng L. M., Diaferio A., Dolag K., Murante G., “*Properties of the diffuse X-ray background in a high-resolution hydrodynamical simulation*” 2006, MNRAS, 368, 74
21. Borgani S., Dolag K., Murante G., Cheng, L.-M., Springel, V., Diaferio, A., Moscardini, L., Tormen, G., Tornatore, L., Tozzi, P., “*Hot and cooled baryons in smoothed particle hydrodynamic simulations of galaxy clusters: physics and numerics*” 2006, MNRAS, 367, 1641
22. Curir A., Mazzei P., Murante G., “*Bar instability in cosmological halos*” 2006, A&A, 447, 453
23. Ettori S., Dolag K., Borgani S., Murante G., “*The baryon fraction in hydrodynamical simulations of galaxy clusters*” 2006, MNRAS, 365, 1021
24. Bodo G., Chagelishvili G., Murante G., Tevzadze A., Rossi P., Ferrari A., “*Spiral density wave generation by vortices in Keplerian flows*” 2005, A&A, 437, 9

25. Diaferio A., Borgani, S., Moscardini, L., Murante, G., Dolag, K., Springel, V., Tormen, G., Tornatore, L., Tozzi, P., “*Measuring cluster peculiar velocities with the Sunyaev-Zeldovich effect: scaling relations and systematics*” 2005, MNRAS, 356, 1477
26. Cheng L.-M., Borgani, S., Tozzi, P., Tornatore, L., Diaferio, A., Dolag, K., He, X.-T., Moscardini, L., Murante, G., Tormen, G., “*Simulating the soft X-ray excess in clusters of galaxies*” 2005, A&A, 431, 405
27. Rasia E., Mazzotta P., Borgani S., Moscardini L., Dolag K., Tormen G., Diaferio A., Murante G., “*Mismatch between X-Ray and Emission-weighted Temperatures in Galaxy Clusters: Cosmological Implications*” 2005, ApJ, 618, L1
28. Zanni C., Murante G., Bodo G., Massaglia S., Rossi P., Ferrari A., “*Heating groups and clusters of galaxies: The role of AGN jets*” 2005, A&A, 429, 399
29. Ettori S., Borgani, S., Moscardini, L., Murante, G., Tozzi, P., Diaferio, A., Dolag, K., Springel, V., Tormen, G., Tornatore, L., “*Evolution at  $z \geq 0.5$  of the X-ray properties of simulated galaxy clusters: comparison with observational constraints*”, 2004, MNRAS, 354, 111
30. Bodo G., Zanni C., Murante G., Rossi P., Massaglia S., Ferrari A., “*Numerical Simulations of the Interaction of Jets with the Intracluster Medium*” 2004, Ap&SS, 293, 247
31. Murante G., Arnaboldi, M., Gerhard, O., Borgani, S., Cheng, L. M., Diaferio, A., Dolag, K., Moscardini, L., Tormen, G., Tornatore, L., Tozzi, P., “*The Diffuse Light in Simulations of Galaxy Clusters*” 2004, ApJ, 607, L83
32. Borgani S., Murante, G., Springel, V., Diaferio, A., Dolag, K., Moscardini, L., Tormen, G., Tornatore, L., Tozzi, P., “*X-ray properties of galaxy clusters and groups from a cosmological hydrodynamical simulation*” 2004, MNRAS, 348, 1078