

# Curriculum Vitae

## Personal data

Name: Miguel Angel Aloy Torás                      DNI: 22566499A  
Date of Birth: March the 4th of 1972              Marital Status: Married  
Particular Address: Berlinerstrasse 76, 2      City: München. Postal Code: 80805  
Home Telephone: + 49 89 3605 57 53          Electronic Address: maa@mpa-garching.mpg.de

## Academic formation

- Graduate on Theoretical Physics. Universidad de Valencia (June 1995).
- Master Thesis: **Hidrodinámica Relativista Numérica Multidimensional**, Universidad de Valencia (March 1997). Mark: *Sobresaliente*.
- Ph.D. in Physics: **Modelos Relativistas Tridimensionales de Chorros Astrofísicos** (December 10th of 1999). Mark: *Sobresaliente Cum Laude*. Supervisors: José M. Ibáñez (Univ. de Valencia) and José M. Martí (Univ. de Valencia).
- Marie Curie Fellow on the Max-Planck-Institut für Astrophysik (January 2001 - December 2002).

## Extra lectures:

- Course on Computational Fluid Dynamics. Von Karman Institute (Brussels). January 7th to 14th of 1996.
- 27<sup>th</sup> Saas Fee Course. Swiss Society of Astrophysics and Astronomy (Les Diablerets). March 3th to 8th of 1997.

## Stays at international research centers

1. Max-Planck-Institute für Astrophysik (Garching). Program of *Acciones Integradas Hispano-Alemanas*. July 21th to 27th of 1996.
2. Centro Europeo de Paralelismo de Barcelona. September 23th to 26th of 1996.
3. Max-Planck-Institute für Gravitationsphysik (Potsdam). March 19th to April 20th of 1997.
4. Max-Planck-Institute für Astrophysik (Garching). Program of *Acciones Integradas Hispano-Alemanas*. November 10th to 22th of 1997.
5. Osservatorio Astronomico di Torino (Pino Torinese). March 30th to April 3th of 1998.
6. Instituto de Astrofísica de Andalucía (Granada). April 27th to 29th of 1998.
7. Max-Planck-Institute für Gravitationsphysik (Potsdam). May 25th to June 21th of 1998.

8. Max–Planck–Institute für Astrophysik (Garching). September 15th to 21th of 1998.
9. Osservatorio Astronomico di Torino (Pino Torinese). July 19th to 25th of 1999.
10. Max–Planck–Institute für Astrophysik (Garching). *María Bueno* MPA-CSIC agreement. October 1st to November 2nd of 1999.
11. Max–Planck–Institute für Astrophysik (Garching). MPA guest program. February 1st to October 31st of 2000.
12. ASCI Flash Center. University of Chicago (Chicago). October 16th of 2001 to November 11th of 2001.
13. CINECA (Bologna). Program: Access to Research Infrastructures of the European Commission. February 19th of 2002 to March 8th of 2002.
14. ASCI Flash Center. University of Chicago (Chicago). May 19th to 29th of 2002.
15. CALTECH. Pasadena (USA). 1 week in October 2002
16. National Space Science and Technology Center. Huntsville (USA). 2 weeks in September 2003

## Congresses

- “Mapping, Modeling and Measuring the Universe”. International workshop on Cosmology organized by the Departamento de Astronomía y Astrofísica and the Universidad Internacional Menéndez Pelayo (Valencia, September 17th to 21st of 1995).
- Encuentros Relativistas Españoles. Valencia, September 10th to 13th of 1996. Title: *Towards a three-dimensional high-resolution shock-capturing code for General Relativity.*
- ETH Zürich: ”Seventh International Conference on Hyperbolic Problems. Theory, Numerics, Applications”, Zürich, February 9th to 13th of 1998. Title: *A 3D high-resolution shock-capturing hydro-code: Simulations of Relativistic Jets.*
- “19th Texas Symposium on Relativistic Astrophysics and Cosmology”. París, December 14th to 18th of 1998.
- “Godunov Methods, Theory and Applications”, Oxford, October 18th to 22nd of 1999. Title: *Simulations of relativistic jets with GENESIS.*
- “Godunov Methods, Theory and Applications”, Oxford, October 18th to 22nd of 1999. Title: *Relativistic jets from Collapsars.*
- “IV Scientific Meeting of the Spanish Astronomy Society”, Santiago de Compostela, September 11th to 14th of 2000. Title: *Cataclysmic progenitors of gamma-ray bursts.*
- “Similarities and Universality in Relativistic Flows”, Mikonos (Greece), October 1st to 5th of 2000. Title: *3D Relativistic Hydrodynamics.* Key-note talk

- “Lighthouses of the Universe”, Garching (Germany), August 6th to 10th of 2001. Title: *Does the plasma composition affect the long term evolution of relativistic jets?*. Poster.
- “Ringberg Workshop on Relativistic Jets”, Rinberg (Germany), September 5th to 7th of 2001. Title: *Numerical Simulations of Relativistical Jets*.
- “From highlight to twilight: The Physics of Supernovae”, Garching (Germany), July 29th to 31th of 2002.
- “V Scientific Meeting of the Spanish Astronomy Society”, Toledo, September 9th to 13th of 2002. Title: *Simulations of precessing jets*
- “Relativistic Winds and Jets from Compact Objects”, Rinberg (Germany), December 15th to 21st of 2002. Title: *Probing the structure of superluminal sources by means of 3D relativistic hydrodynamic simulations*.
- “Supernovae. 10 years of SN1993J”. IAU Colloquium 192, Valencia, April 22nd to 26th of 2003. Title: *First steps in the life of a GRB*.
- “2003 GRB conference”. Santa Fe (USA), September 8th to 12th of 2003. Title: *First steps in the life of a GRB*.
- “Virtual Jets 2003”. Dogliani (Italy), October 2nd to 4th of 2003. Title: *Probing the structure of superluminal sources using 3D simulations of relativistic precessing jets*.
- “Fiveth INTEGRAL Workshop: The INTEGRAL Universe”. Munich (Germany), February 16th to 20th of 2004. Title: *Producing a short GRB*.
- “Large Scale Computation in Astrophysics”. Cambridge (UK), October 11th to 16th of 2004. Title: *Short and long term simulations of relativistic, magnetized jets*. Invited talk.
- “Gamma-Ray Bursts in the Afterglow Era”. Rome (Italy), October 18th to 22nd of 2004. Title: *Producing short GRBs from coalescing compact binaries*.
- “22nd Texas Symposium on Relativistic Astrophysics”. Palo Alto (USA), December 13th to 17th of 2004. Title: *Relativistic outflows from remnants of compact object mergers and their viability for short gamma-ray bursts*.

### International Seminars

- *Numerical Relativistic Hydrodynamics*. Max-Planck-Institute für Gravitationsphysik (Potsdam, April 1st of 1997).
- *Simulation of AGN Jets*. Landessternwarte Königstuhl (Heidelberg, April 17th of 1997).
- *A new frontier in astrophysical jet research: 3D Simulations of Relativistic Jets*. Instituto de Astrofísica de Andalucía (Granada, April 28th of 1998).
- *Simulations of relativistic jets with GENESIS*. Instituto de Astrofísica de Andalucía (Granada, May 24th of 1999).

- *Unveiling the structure of relativistic jets.* Max–Planck–Institut für Astrophysik (Garching, April 3rd of 2000).
- *The influence of the plasma composition on the long term evolution of relativistic jets.* Sondersforschungsbereich 439 seminar. Landessternwarte Königstuhl (Heidelberg, November 28th of 2001).
- *Proving the existence of phantoms.* Departamento de Astronomía y Astrofísica, Univ. de Valencia (Burjassot, January 15th of 2002).
- *Helical motions in parsec scale jets.* Max–Planck–Institut für Astrophysik (Garching, February 4th of 2002).
- *Progenitors of Gamma Ray Bursts.* California Institut of Technology (Pasadena, May 15th of 2002).
- *Progenitors of Gamma Ray Bursts.* National Space Science and Technology Center (Huntsville, May 10th of 2002).
- *Simulations of parsec scale jets.* Max–Planck–Institut für Radioastronomy (Bonn, June 14th of 2002).
- *First steps in the life of a GRB.* Institut d’Estudis Espacials de Catalunya (Barcelona, April 29th of 2003).
- *First steps in the life of a GRB.* University of Alabama in Tuscaloosa (Tuscaloosa, September 17th of 2003).
- *First steps in the life of a short GRB.* National Space Science and Technology Center (Huntsville, September 19th of 2003).

### **Fellowships and Research Contracts**

1. **Undergraduate Collaboration fellowship** in the Departamento de Física Teórica (Univ. Valencia). 1994 - 1995.
2. **Summer Fellowship** at the Instituto de Astrofísica de Canarias. July 1st to September 15th of 1995.
3. **Predoctoral fellowship** of the Conselleria de Cultura of the Generalitat Valenciana. 1996 - 1999.
4. **María Bueno fellowship** from the CSIC–MPA agreement. October 1st to November 2nd 1999.
5. **Guest scientist** at the Hydrodynamics group of the MPA from February 1st of 2000 to October 31th of 2000. Host scientist: Dr. habil Ewald Müller.
6. **Marie Curie fellowship** at the MPA from January 2001 to December 2002.

7. **Postdoctoral contract** at the MPA from January 2003.
8. **María Bueno fellowship** from the CSIC–MPA agreement. December 2nd to January 7th 2000.
9. **María Bueno fellowship** from the CSIC–MPA agreement. August 1st to September 22nd 2002.
10. **María Bueno fellowship** from the CSIC–MPA agreement. December 20th (2002) to January 19th 2003.

**Practical skills of scientific interest**

1. Relativistic Hydrodynamics (numerical and theoretical).
2. Numerical simulations of extragalactic jets and some progenitors of Gamma Ray Bursts.
3. Physics of compact objects.
4. FORTRAN, C and Perl programming.

## List of Publications

As first author:

1. Towards a three-dimensional high-resolution shock-capturing code for General Relativity. Aloy, M.A.. Proceedings of the Encuentros Relativistas Españoles in: *Some topics on General Relativity and Gravitational Radiation*, eds. J.A. Miralles, J.A. Morales and D. Sáez. Editions Frontières (1997), p. 141.
2. GENESIS: A high-resolution code for 3D relativistic hydrodynamics. Aloy, M.A., Ibáñez, J.M<sup>á</sup>., Martí, J.M<sup>á</sup>., and Müller, E. 1999, *ApJ Suppl. Series*, 122, 151.
3. High-resolution 3D simulations of relativistic jets. Aloy, M.A., Ibáñez, J.M<sup>á</sup>., Martí, J.M<sup>á</sup>., Gómez, J.L., and Müller, E. 1999, *ApJ Letters*, 523, L125.
4. An efficient implementation of flux formulae in multidimensional relativistic hydrodynamics. Aloy, M.A., Pons, J.A., and Ibáñez, J.M<sup>á</sup>., 1999, *Comp. Phys. Communications*, 120, 115.
5. Radio Emission from 3D Relativistic Hydrodynamical Jets: Observational Evidence of Jet Stratification. Aloy, M.A., Ibáñez, J.M<sup>á</sup>., Martí, J.M<sup>á</sup>., Gómez, J.L., and Müller, E. 2000, *ApJ Letters*, 528, L85.
6. Relativistic Jets from Collapsars. Aloy, M.A., Müller, E., Ibáñez, J.M<sup>á</sup>., Martí, J.M<sup>á</sup>., and MacFadyen, A. 2000, *ApJ Letters*, 531, L119.
7. Simulations of relativistic jets with GENESIS. In “Godunov Methods, Theory and Applications”, ed. E. F. Toro (2001), p. 45. Aloy, M.A., Ibáñez, J.M<sup>á</sup>., Martí, J.M<sup>á</sup>., Gómez, J.L., and Müller, E. (or astro-ph/9910464).
8. Relativistic jets from Collapsars. In “Godunov Methods, Theory and Applications”, ed. E. F. Toro (2001), p. 53. Aloy, M.A., Müller, E., Ibáñez, J.M<sup>á</sup>., Martí, J.M<sup>á</sup>., and MacFadyen, A. (or astro-ph/9910466).
9. Cataclysmic progenitors of Gamma-ray bursts. Aloy, M.A.. Proceedings of the Scientific Meeting of the Sociedad Española de Astronomía in: *Highlights of Spanish Astrophysics II*, eds. J. Zamorano, J. Gorgas and J. Gallego. Kluwer Academic Publishers (2001), p. 33.
10. Three dimensional relativistic hydrodynamics. In “Relativistic Flows in Astrophysics”, eds. A.W. Guthmann, M. Georganopoulos, A. Marcowith, K. Manolakou, Springer Verlag Series ”Lecture Notes in Physics” 2002, p. 197. Aloy, M.A., Martí, J.M.
11. Stability analysis of relativistic jets from collapsars and its implications on the short-term variability of gamma-ray bursts. Aloy, M.A., Ibáñez, J.M., Miralles, J.A. and Urpin, V. 2002, *A&A*, 396, 693.
12. 3D Simulations of Precessing Jets Probing the Structure of Superluminal Sources. Aloy, M.A., Martí, J.M<sup>á</sup>., Gómez, J.L., Agudo, I., Müller, E. and Ibáñez, J.M. 2003, *ApJ Letters*, 585, L109

13. Simulations of precessing jets. Aloy, M.A., Martí, J.M<sup>a</sup>., Gómez, J.L., Agudo, I., Müller, E. and Ibáñez, J.M. Proceedings of the Scientific Meeting of the Sociedad Española de Astronomía in: *Highlights of Spanish Astrophysics III*, eds. J. Zamorano, J. Gorgas and J. Gallego. Kluwer Academic Publishers (2002), p. 23.
14. The first steps in the life of a short GRB. Aloy, M.A. Proceedings of the IAU 192 colloquium in: *Cosmic Explosions*, eds. J.M. Marcaide, K.W. Weiler. Springer Proceedings in Physics (2004), 99, 483–489.
15. The first steps in the life of a short GRB. Aloy, M.A. Proceedings of the 2003 GRB conference, Santa Fe in: *Gamma-Ray Bursts: 30 years of discovery*, eds. E. Fenimore, M. Galassi, AIP Conference Proceedings (2004), 727, 380–383.
16. Probing the structure of superluminal sources using 3D simulations of relativistic precessing jets. Aloy, M.A. Proceedings of the Virtual Astrophysical Jets 2003. Eds. S. Massaglia, G. Bodo, P. Rossi. To appear in an special issue of APSS.
17. Numerical Simulations of Relativistic Jets. Aloy, M.A., Martí, J.M<sup>a</sup>., and Ibáñez J.M<sup>a</sup>.: Boletín de la Sociedad Española de Astronomía, **19**, 11 (2004).
18. Relativistic outflows from remnants of compact object mergers and their viability for short gamma-ray bursts. Aloy, M.A., Janka, H.-T. and Müller E., *A&A*, in press.

as coauthor:

1. Dolls Astrofísica Relativista. Martí, J.M<sup>a</sup> and Aloy, M.A., (1999), *Métode*, **21**, 31–33
2. 2D Hydrodynamic Simulations of Relativistic Jets from Collapsars. AIP Conference Proceedings for the “The Fifth Huntsville Gamma-Ray Burst Symposium”, Huntsville, October 19th to 22th of 1999. Eds. R.M. Kippen, R.S. Mallozzi, G.J. Fishman. Müller, E., Aloy, M.A., Ibáñez, J.M<sup>a</sup>., Martí, J.M<sup>a</sup>., and MacFadyen, A., (2000), 526, 565.
3. Riemann Solvers in General Relativistic Hydrodynamics. In “Godunov Methods, Theory and Applications”, ed. E. F. Toro (2001), p. 485. Ibáñez, J.M<sup>a</sup>., Aloy, M.A., Font, J.A., Martí, J.M<sup>a</sup>., Miralles, J.A., and Pons, J.A. (or astro-ph/9911034).
4. Jet stability and the generation of superluminal and stationary components. Agudo, I., Gómez, J.L., Martí, J.M<sup>a</sup>., Ibáñez, J.M<sup>a</sup>., Aloy, M.A., and Hardee, P.E. (2001), *ApJ Letters*, 549, 183
5. Jet stability and the generation of superluminal and stationary components. To appear in the proceedings of the XXXII Young European Radio Astronomer’s Conference, Granada, September 17th to 20th of 2000. Agudo, I., Gómez, J.L., Martí, J.M<sup>a</sup>., Ibáñez, J.M<sup>a</sup>., Marscher, A.P., Alberdi, A., Aloy, M.A., and Hardee, P.E.
6. Polarimetric VLBI observations of 0735+178. EVN Symposium 2000, Proceedings of the 5th European VLBI Network Symposium, Gothenburg, Sweden, June 29 to July 1, 2000. Eds.: J.E. Conway, A.G. Polatidis, R.S. Booth and Y.M. Pihlström. Onsala Space

- Observatory, p. 67. Agudo, I., Gomez, J.L., Gabuzda, D.C., Guirado, J.C., Alberdi, A., Marscher, A.P., Aloy, M.A., and Marti, J.M.
7. Does the plasma composition affect the long term evolution of relativistic jets?. Scheck, L., Aloy, M.A., Martí, J.M.<sup>a</sup>, Gómez, J.L., and Müller, E. (2002) *MNRAS*, 331, 615
  8. Hydrodynamical and emission simulations of relativistic jets: stability and generation of superluminal and stationary components. Agudo, I., Gómez, J.L., Martí, J.M.<sup>a</sup>, Ibáñez, J.M.<sup>a</sup>, Marscher, A.P., Alberdi, A., Aloy, M.A., and Hardee, P.E. *Astrophys. & Space Science*, **276**(suppl.), 293–294 (2001).
  9. Numerical simulations of relativistic jets. Martí, J.M.<sup>a</sup>. and Aloy, M.A.. Proceedings of the Ringberg Workshop on Relativistic Jets. <http://www.MPA-Garching.MPG.DE/en-sslin/Jets/Proceedings>.
  10. Synthetic X-ray light curves of BL Lacs from relativistic hydrodynamic simulations. Mimica, P., Aloy, M.A., Müller, E. and Brinkmann, W. 2004, *A&A*, 418, 947–958.
  11. Computation of X-ray Blazar Light Curves using RHD simulations. Mimica, P., Aloy, M.A., Müller, E. and Brinkmann, W. 2003. Proceedings of the Virtual Astrophysical Jets 2003, in *Virtual Astrophysical Jets*, eds. S. Massaglia, G. Bodo, P. Rossi, Astrophysics and Space Science (2004), 293, 165–172.
  12. MHD Simulations of Relativistic Jets. Leisman, T., Aloy, M.A., and Müller, E. 2003. Proceedings of the Virtual Astrophysical Jets 2003, in *Virtual Astrophysical Jets*, eds. S. Massaglia, G. Bodo, P. Rossi, Astrophysics and Space Science (2004), 293, 157–163.
  13. RMHD simulations of extragalactic jets. Leismann, T., Antón, L., Aloy, M.A., Müller, E., Martí, J. M., Miralles, J. A., Ibáñez, J. M., *A&A*, in press.