INSTITUTO DE ASTROFÍSICA DE MADRID
Science fiction or top science?

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In Spain, there is an *Instituto de Astrofísica de Canarias* in Tenerife, an *Instituto de Astrofísica de Andalucía* in Granada and an *Institut d'Estudis Espacials de Catalunya* in Barcelona. However, there is not an **Instituto de Astrofísica de Madrid** (IAM). Actually, Madrilenian astronomers are spread over a number of institutions of quite different origin, size and funding source. The IAM, if it existed, would be a catalyzer of ideas and collaborations, an international meeting point, an engine for high-technology industry in the region, and an excellence centre. Furthermore, the IAM would maximise the efficiency in the use of resources, offer a place for finding synergies between research groups and, especially, have a critical mass for embarking in very large projects in the ground and space. I will expose how, in a smooth and democratic way, an IAM might be built step by step. The process may take decades and, thus, young Madrilenian astronomers shall play a role on it.

Step -1. *Last century.* In the late 60s, there were in Madrid only a *cátedra de Astronomía y Geodesia* in the old Universidad Central, hold by José María Torroja and supported by Antonio Romañá of the Observatorio del Ebro, and the Observatorio Astronómico de Madrid, the seed of the current Observatorio Astronómico Nacional (OAN), directed by Manuel López Arroyo. There was also the Instituto de Óptica Daza de Valdés of the CSIC. The current picture is rather complex (see right figure).

Step 0. *Last quinquennium.* Astrid + AstroCam = *"AstroMadrid: Astrofísica y desarrollos tecnológicos en la Comunidad de Madrid"*. Between 2010 and 2013, AstroMadrid gave the opportunity to coordinate and optimize activities of Madrilenian centres on astronomical instrumentation development. Previously, the region had two projects, Astrid and AstroCam, that eventually merged.

Step 1. *This poster*. Did you know that Albert Einstein was one of the first proposers of a federal "European Union"? Why not building a "Union of Madrilenian Astrophysical centres" through consensus and negotiation? See the abstract again for the advantages.

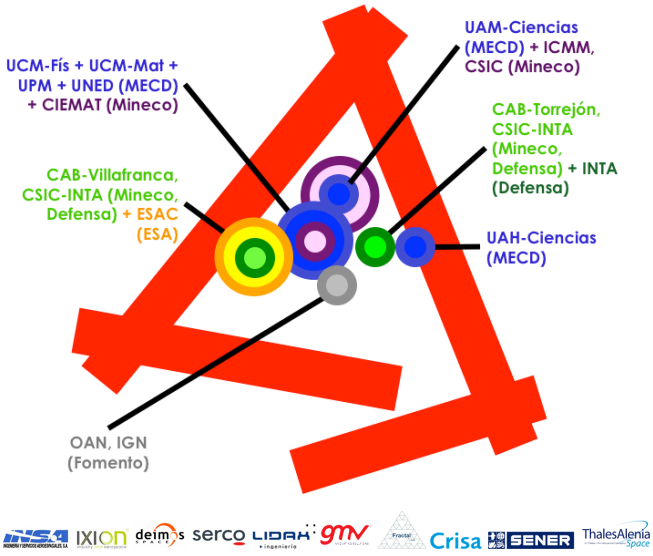
Step 2. *Next quinquennium.* How to join efforts and find synergies? A "Madrid Astrophysics Network", involving research centres, industry and the Madrid aerospace cluster, has been proposed (AstroMadrid dossier 2013). However, another call for funding R&D activities between research centres and groups in the Comunidad de Madrid is needed to develop the concept.

Step 3. *Early next decade*. Constitution of a "Virtual IAM", a legal entity involving all centres, with limited but useful and cost-saving capabilities focused on administration of inter/national projects, software licenses, journal subscriptions, e-mail and web servers… Management would be distributed among the current centres, which would maintain their autonomy. IAM may be a second affiliation in publications.

Step 4. *Late next decade.* Turn the "Virtual IAM" into a real IAM with physical headquarters. There would be temporary space only for an informatics user support unit, administrative assistants, managers, a "joint chief of staff" and a couple of meeting rooms, available to all researchers. The chiefs could be two directors of the still-autonomous centres, who would be replaced annually, as in the rotating presidency of the EU.

Step 5. *Early 2030s.* If everything has gone well, the Madrid Regional Government and the Spain Ministries of Science, Education, Defence and Public works have agreed a formula to put IAM into action, within the limitations of at least CSIC, INTA and IGN. The Universities may keep associated to the core of the definitive IAM; they preserve the freedom and idiosyncracy of University Departments, but also offer a legal frame to MSc and PhD students.

Step 5. *Late 2030s.* Today's infrastructures have grown old, while big and complex instruments are being planned and built worldwide for space and ground telescopes. In twenty years from now, "classic" centres close to ESAC and Universities, now IAM campuses, are still operative, but new mechanical engineers, post-docs and PhD students are now being moved to recently-built premises in *Villaalmendruco de Todo lo Alto*, which is very well communicated by public transport. The land has been handed over for free by the Comunidad de Madrid, while the large, state-of-the-art, eco-sustainable building has been erected with public funding and private donors. Spain's research and development spending has increased to over 3%, at the level of South Korea, Japan or Sweden. A significant fraction of the Science budget goes now to Astrophysics thanks to the public impact of the discovery of the origin of dark energy and of the first habitable exo-earth by Spanish researchers. *Science fiction or top science?*



Sketch of the main Astrophysics centres in Madrid (Sep 2014). There are four key nodes in Ciudad Universitaria (UCM, UPM, UNED), Villafranca del Castillo (CAB, ESA's ESAC), Cantoblanco (UAM, ICCM) and Autovía A-2 (CAB, INTA, UAH). OAN remains as the only centre in the built-up area. Some headquarters of high-technology and aerospace companies are also in Madrid, A-2 and Tres Cantos.

Choose your IAM logo! Seven five-pointed stars in silver on crimson red. Pleiades, Orion or Ursa Major?

Cucaña or *castell*? In the *cucaña*, one person has to climb up a greasy, slippery pole, sometimes with the obstruction of rivals. However, the *colles castelleres* work together and assemble a tower of people with a *pinya* of strong men at the base. The *enxaneta*, the topmost *casteller*, is a child.