

Action Spécifique Numérique

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2025 - 2029

Aims

- Convergence of the HPC and HPDA communities.
- Optimizing performance, method quality, software and hardware.
- Identifying available tools and resources, and learning how to use computing resources effectively.
- Developing links with other communities related to computer sciences.
- Taking into account the societal and technological impact of research in the field of HPC/HPDA (incl. environmental impacts).

A key challenge of the national strategic vision ('prospective') for the future of astrophysics:
Developing innovative digital methods for studying the universe, from big data to artificial intelligence and high-performance computing.

Scientific council

- Benoît Cerutti, IPAG – Webinaires and workshops
- Benoît Commerçon, CRAL – Workshops, schools and conferences
- Yohan Dubois, IAP – SNO
- Marc Huertas-Company, IAC/LUX – Machine learning
- Laurène Jouve, IRAP – Teaching and ASNum schools
- François Lanusse, AIM – Statistical methods
- Héloïse Méheut, Lagrange - Coordination
- Ada Nebot, CDS – Virtual observatory
- Simon Prunet, Lagrange – Signal analysis
- André Schaaff, CDS – Databases and webinars
- Christian Surace, LAM – Computing centers

ASNum : place for computational astrophysics

- Workshops and conferences
 - ✓ ASNum days 2022 Lyon – Launch conference
 - ✓ SF2A days 2024 Marseille - workshop ASNum
 - ✓ SF2A days 2025 Toulouse - workshop ASNum
 - ✓ **ASNum days 2025 Grenoble**
 - ✓ HPC school spring 2026 Lyon
 - ✓ SF2A days June 2026 Grenoble
- Mailing list
 - ✓ ~200 active email addresses (f/m ~20 %)
 - ✓ 2025 : **environmental footprint of computing infrastructures**
 - ✓ Subscribe here:
<https://listes.services.cnrs.fr/wws/subscribe/asn-insu> or send an email to sympa@services.cnrs.fr with object: subscribe asn-insu FirstName LastName
- Funding young researchers (phd students and post-docs) to participate to workshops, conferences, ...

Webinars

- Thanks to Benoît Cerutti, André Schaaf
- Recents webinars
 - ✓ September 2025: Multiband image fusion under spectrally varying spatial blurs — Application to JWST data - Nicolas Dobigeon (Toulouse INP)
 - ✓ October 2025: Hydrodynamical simulations of the reflex instability in protoplanetary discs – Clément Baruteau (IRAP)
 - ✓ November 2025: Proto-neutron star dynamos and magnetar formation: from simulations towards observations – Raphaël Raynaud (AIM)
- Recordings on the Peertube instance from Observatoire de Paris :
https://astrotube.obspm.fr/c/aschaaf_channel/videos



AstroTube

Funding projects

- Exemples
 - ✓ Hands-on days DYABLO code
 - ✓ Collaborative development of RASCAS code
 - ✓ Enhancing the legacy of the π -DOC algorithm for globular cluster analysis
 - ✓ Atmospherix - Pipeline for processing, analyzing, and retrieving atmospheric parameters from high-resolution exoplanet spectroscopy data
 - ✓ Meudon PDR Code
 - ✓ Publications of HPC simulations based on the Galactica database
 - ✓ Cesam2k20 – Stellar evolution.
 - ✓ Interdisciplinary exchanges in computational astrophysics in cosmology/computer science
- PI
 - ✓ Researchers or engineers
 - ✓ Laboratories of INSU astrophysics, INS2I (computer science) or IN2P3 (particle physics)
- Fewer requests for projects in machine learning or data analysis (already funded/not considered as computational astrophysics?)
- Alignment of the schedule with that of AT/PN in 2025 : applications files (2p) in september

Expertise

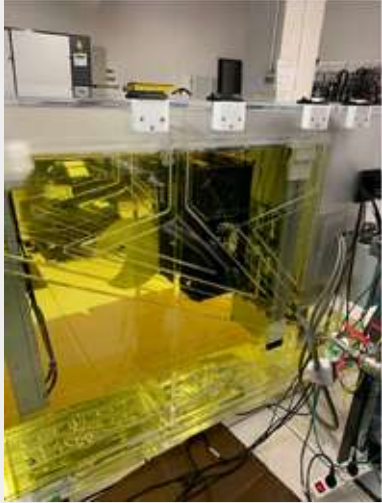


Image : PSMN - Lyon

SUN

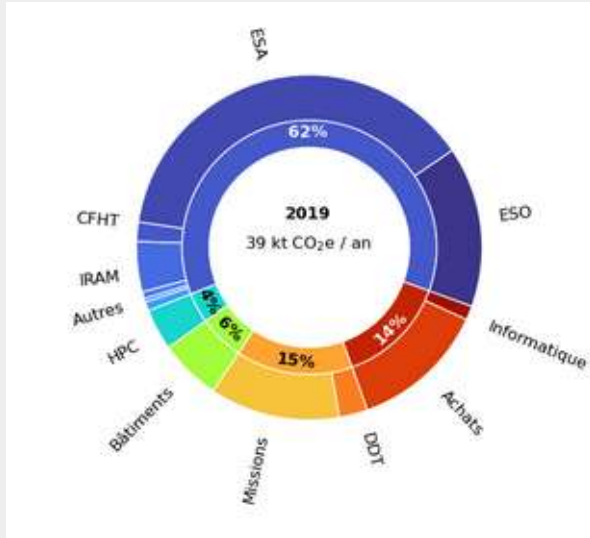
Sciences de l'Univers et du Numérique

- CSAA : Survey of computing centers/laboratories on energy footprint (2022)
- INSU : Programme national Sciences de l'Univers et du Numérique
- Maison de la Simulation (UMS INS2I) : for expertise in computational astrophysics and national overview

ASNum Days

- People : ~ 70 participants
 - ✓ Diversity of expertise : CNRS - INSU (incl outside A&A), IN2P3, INP, INS2I, INSMI, INSIS - INRIA, CEA ... & abroad
 - ✓ Weak gender diversity (f/m <10%), especially among young researchers
- Astrophysics domains : PNP/AT PS/ PCMI/CG/PEM/ST
- Major codes : Dyablo/PHARE/RAMSES/SMILEI/NIRVANA/cuHARM /IDEFIX/SHAMROCK...
- Variety of numerical methods, models, ...
- Infrastructures : GENCI, EuroHPC, mesocenter, GRICAD, CDS, SKA, LSST, ALMA
- Institutional : PN SUN, PEPR Origins & Numpex, SNO

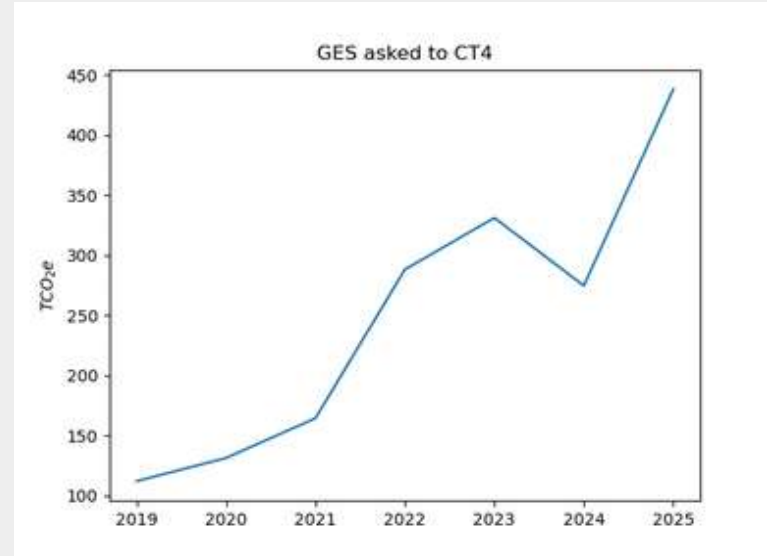
Carbon footprint of computational astrophysics



Santerne et al. (in prép.); Knödseder et al. 2022, 2024

- Estimation GES1point5
 - 0.00062 kg eCO₂/h/core CPU
 - 0.03337 kg eCO₂/h/GPU

ASNum days



Gender diversity in computational astrophysics

- ~30% in Master and PhD in astro, ~25% astronomers with a permanent position
- 20% in the ASNum mailing list, 10% in this conference, and very few female young researchers
- Improvement needed – educate yourself (see e.g. Isabelle Collet – Uni. Genève, Felliëne Hermans -Vrije U. Amsterdam)

<https://iframe.mediadelivery.net/embed/338510/419859c5-6a8f-4a49-b324-0f225e083114?autoplay=false>



ASNum days

Proportion de femmes en 2024		
	Rang B	Rang A
CNRS 1	24.2 %	23.9 %
CNRS 2	11.1 %	11.1 %
CNRS 17	25.0 %	25.2 %
CNRS 18	39.2 %	28.4 %
CNRS 19	31.1 %	25.5 %
CNAP AA	31.1 %	25.5 %
CNU 34	21.6 %	17.6 %

