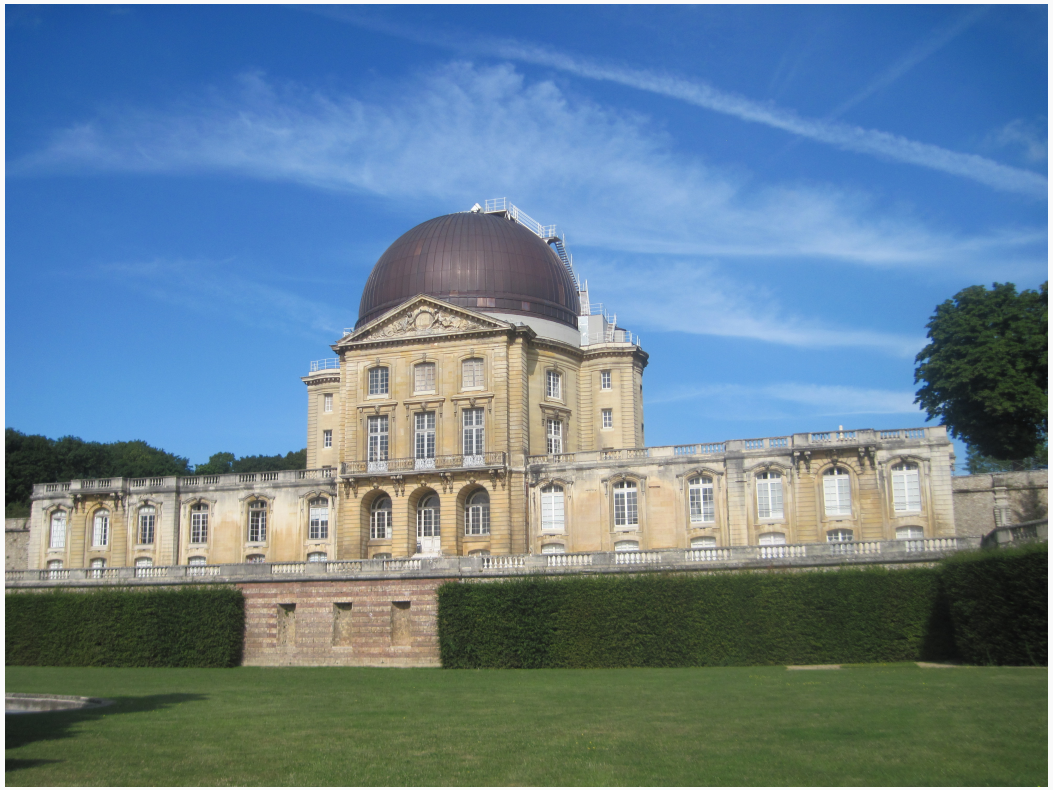
What is LUTH ?

Laboratoire Univers et THéories

- Dedicated to theory and modeling in astrophysics.
- Since 2002.
- One of the seven laboratories of Paris Observatory.
- Located on the Meudon site (20mn from Montparnasse).



Administrative information

Institutions

- Observatoire de Paris ; PSL
- CNRS
- Université de Paris ; UDP.

Staff

- Director : Philippe Grandclément.
- Deputy-director : Andreas Zech.

Human resources

People

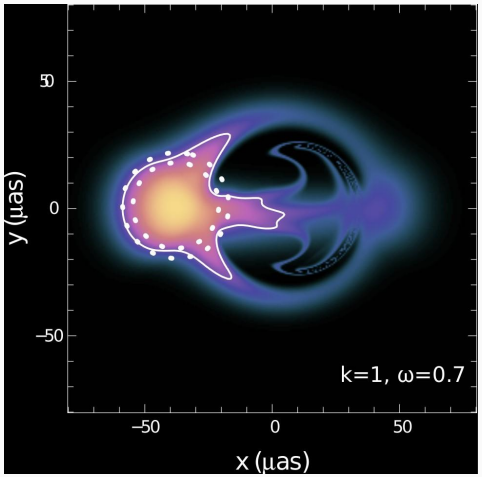
- 17 researchers (12 CNRS, 2 CNAP, 3 MdC).
- 5 computer and numerical support.
- 3 administrative staff.
- 8 post-doc/PhD
- 6 emeritus.
- part of the Observatory (approx. 350 researchers).

Doctoral schools

- No researcher at STEPUP.
- Most of them from ED 127 (Astronomy and Astrophysics)
- A few from ED 564 (Physics Ile de France)
- Not an issue for students from NPAC.

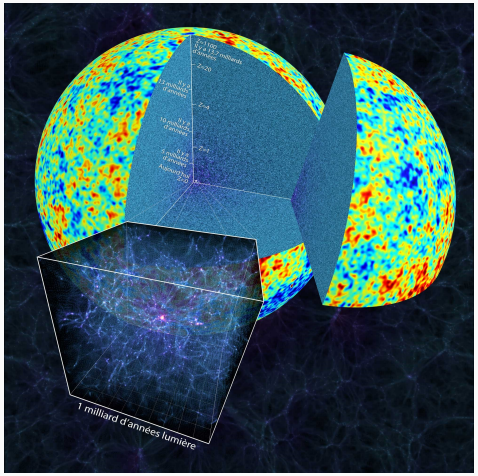
The teams

LUTH is organized around three teams :



Relativity Compact Objects (ROC)

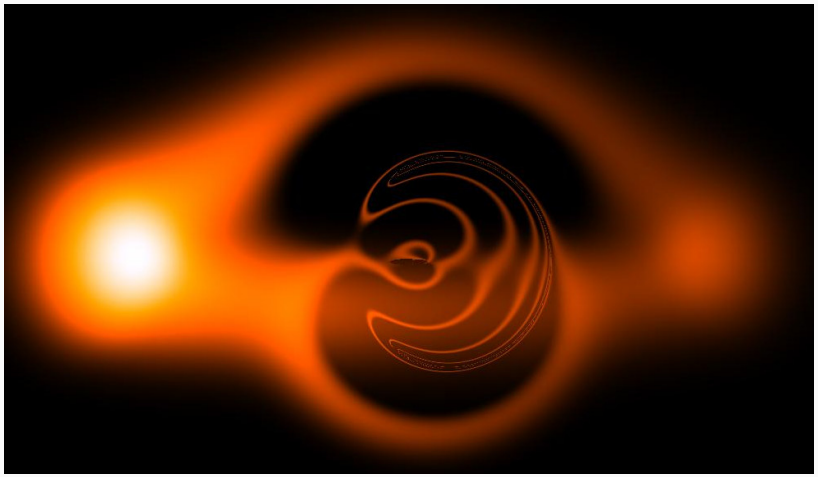
High energy phenomenon (PHE)



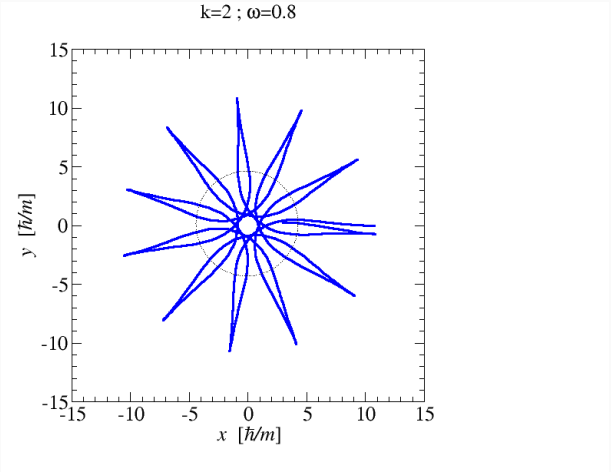
Cosmology (COS)

Activities at ROC (1/3)

Tests of gravity in the strong field regime (black hole paradigm, alternative theories of gravity)



Accretion disk around a naked singularity

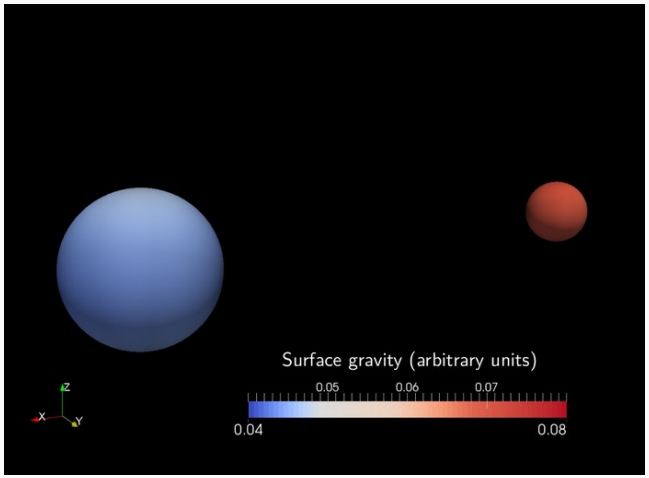


Orbit around a boson star.

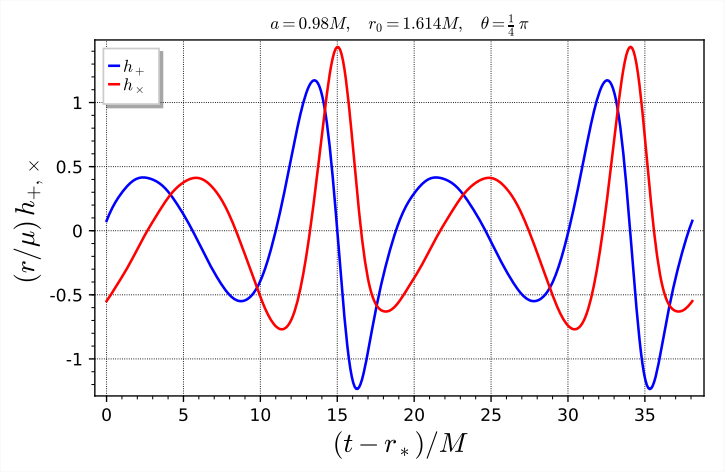
Mainly amounts to solving Einstein equations numerically and extract meaningful information.

Activities at ROC (2/3)

Compact objects as sources of gravitational waves



Binary black hole config.

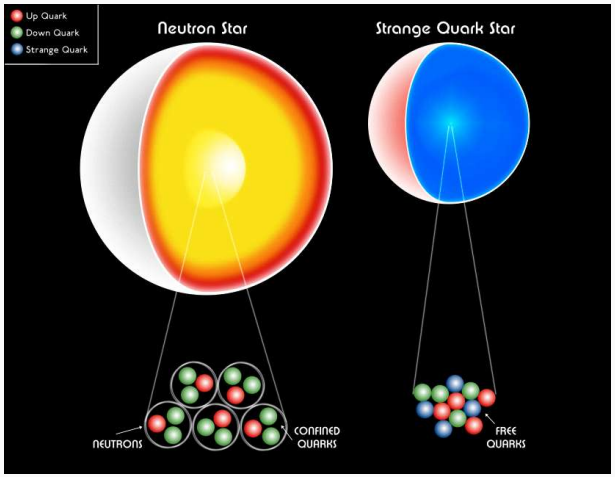


Gravitational waves predictions.

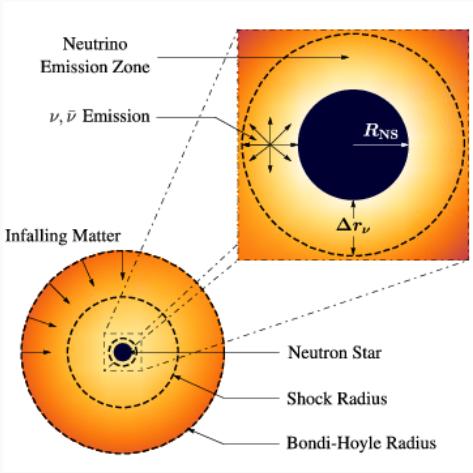
Both numerical studies and analytical ones (pN expansions for instance).

Activities at ROC (3/3)

Supernovae and dense matter.



Nature of ultra-dense matter.

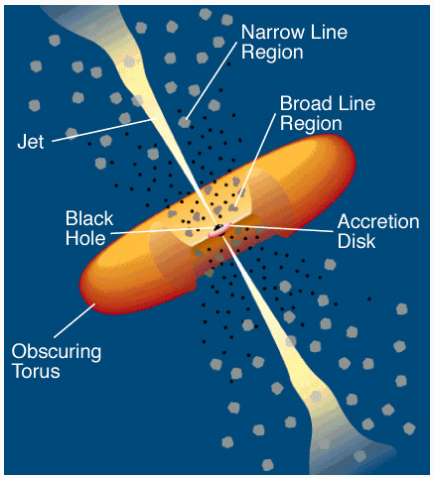


Effect of neutrinos on SN.

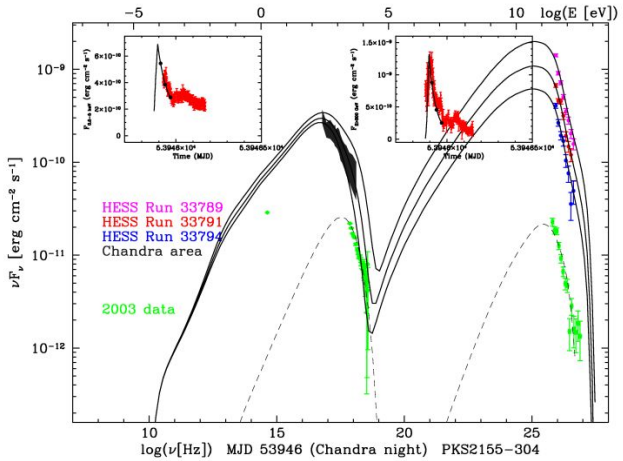
Numerical studies coupled to results of nuclear physics.

Activities at PHE (1/3)

Active Galactic Nuclei modeling.



AGN paradigm.



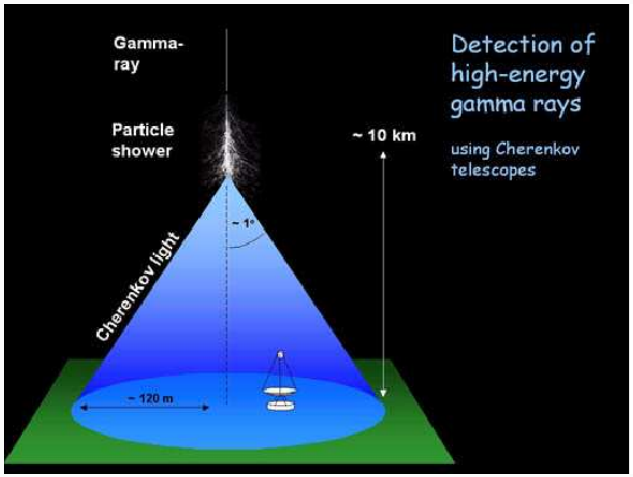
Fit of the 2nd flare by SSC time-dependent modeling :
Reproduce light curves and spectra in X and gamma rays

Spectrum modeling.

Models for emission and comparison with observations.

Activities at PHE (2/3)

Gamma ray observations

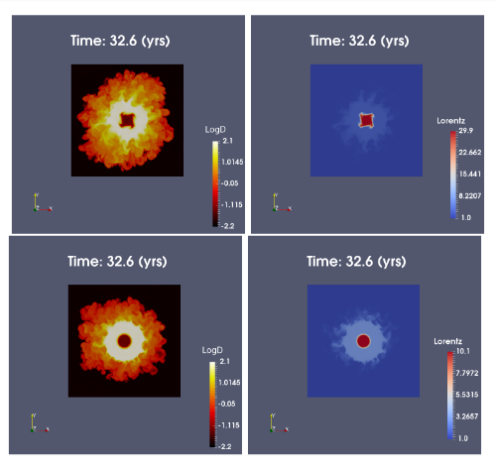


HESS telescope.

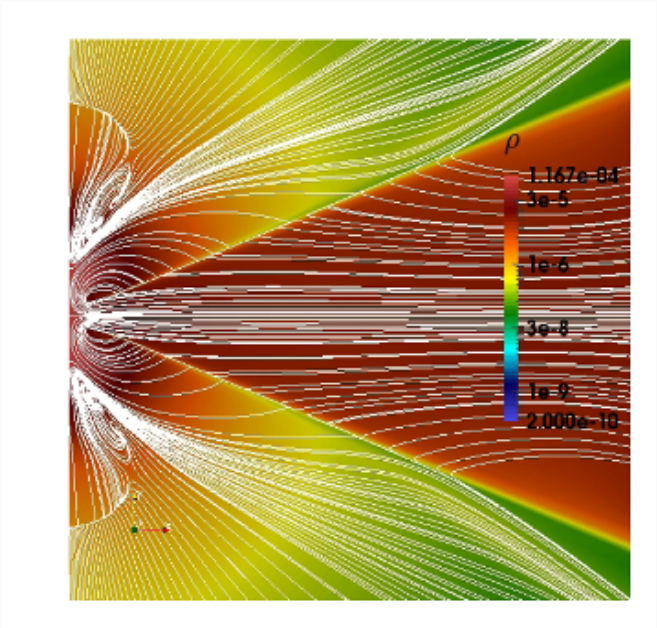
Preparation of CTA (GCT prototype).

Activities at PHE (3/3)

MHD simulations : accretion disks, jets, magnetic fields.



Jet stability.

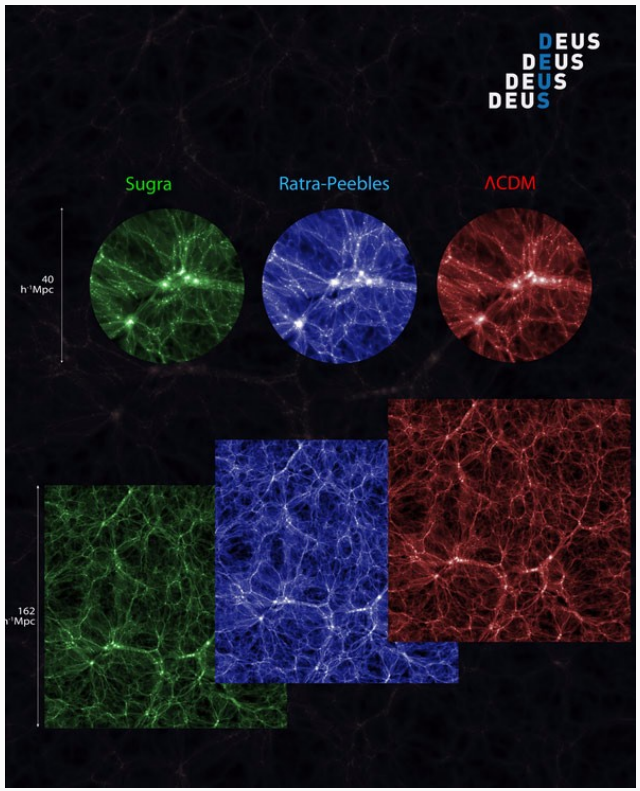


Accretion disk around a Boson star.

Numerical MHD simulations.

COS activities

Mainly study the effect of dark matter on the formation of structures in the Universe.



HPC, N-body simulations.

PHD at COS (1/2)

Dynamics of baryons in non-standard cosmologies

- Goal : Understanding the impact of the hypotheses on the nature of dark energy and dark matter on the formation and evolution of galaxies.
- Tools : numerical methods, analytical modeling.
- Codirection : Pier-Stefano Corasaniti (LUTh) and Yohan Dubois (IAP).

PHD at COS (1/2)

Relativistic effects as dark energy probe : gravitational lensing and the distribution of galaxies

- Goal : study the propagation of light into universe simulation. Use the results to probe the effect of dark energy.
- Tools : numerical methods, HPC simulations, statistical analysis.
- Direction : Yann Rasera (LUTh).

Last words...

- LUTH is dedicated to theoretical astrophysics and modeling with a strong numerical component.
- Three teams COS, PHE and ROC.
- Relatively small unit but part of the Observatory.
- Two PHD proposed in cosmology.
- Do not hesitate to contact other members of laboratory.