Fermi Telescope, Black Holes and Dark Matter

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See next slide for more info

Jan. 23 2017

INFIERI School @ USP

Practical information i

The two lab sessions have the same content. If you want to attend one of the two sessions, please let us know by e-mailing: `fabio.cafardo [[at]] usp.br` with your name and university

Where: IAG USP, sala A304

Capacity of lab: 15 people

When:

- ☑ *First lab session*: Jan 31st (Tue), 2-5pm
- ☑ *Second lab session*: Feb 1st (Wed), 2-5pm

Questions? `rodrigo.nemmen [[at]] iag.usp.br`

https://rodrigonemmen.com

Practical information ii

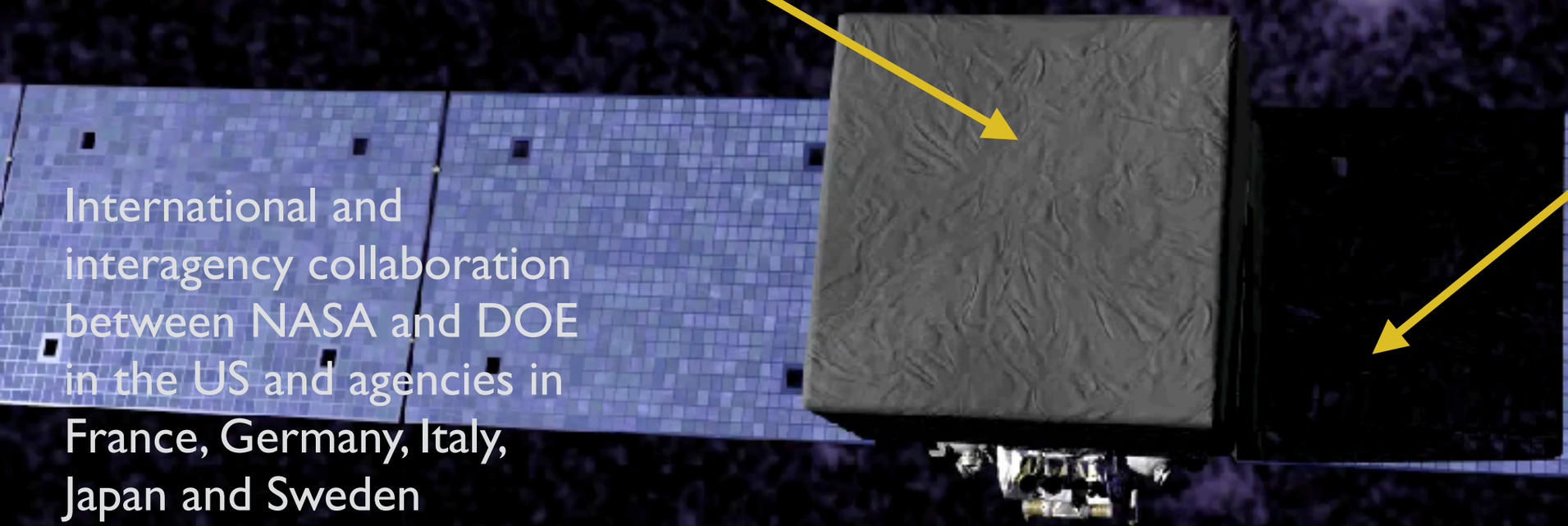
The Astronomy Institute (IAG) has a *security check* at the institute's gate. **Please arrive at IAG 30 minutes before the activity starts**, in order to allow enough time for ID processing.

Fermi Gamma Ray Telescope: LSST for high-energy sky, 20 MeV - 300 GeV, whole sky every 3 hours

R. Nemmen

Large Area Telescope (LAT)

Observes 20% of the sky at any instant, entire sky every 3 hrs
20 MeV - 300 GeV



International and interagency collaboration between NASA and DOE in the US and agencies in France, Germany, Italy, Japan and Sweden

Gamma-ray Burst Monitor (GBM)

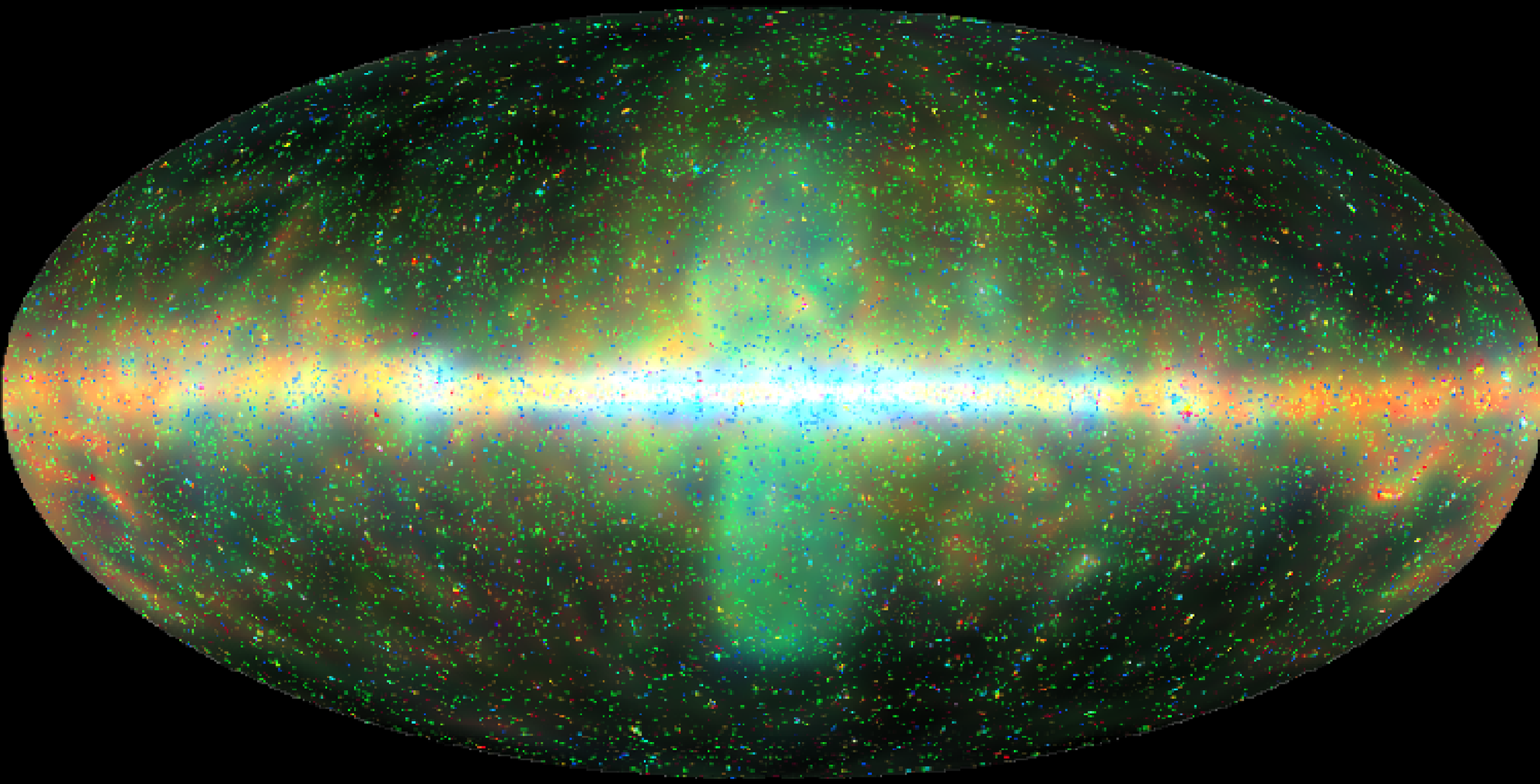
Observes entire unocculted sky
Detects transients from 8 keV - 40 MeV

Unique Capabilities for GeV astrophysics

- **Large effective area**
- **Good angular resolution**
- **Huge energy range**
- **Wide field of view**

Mission Lifetime: 5 year requirement, 10 year goal

Gamma-ray sky after 7 years

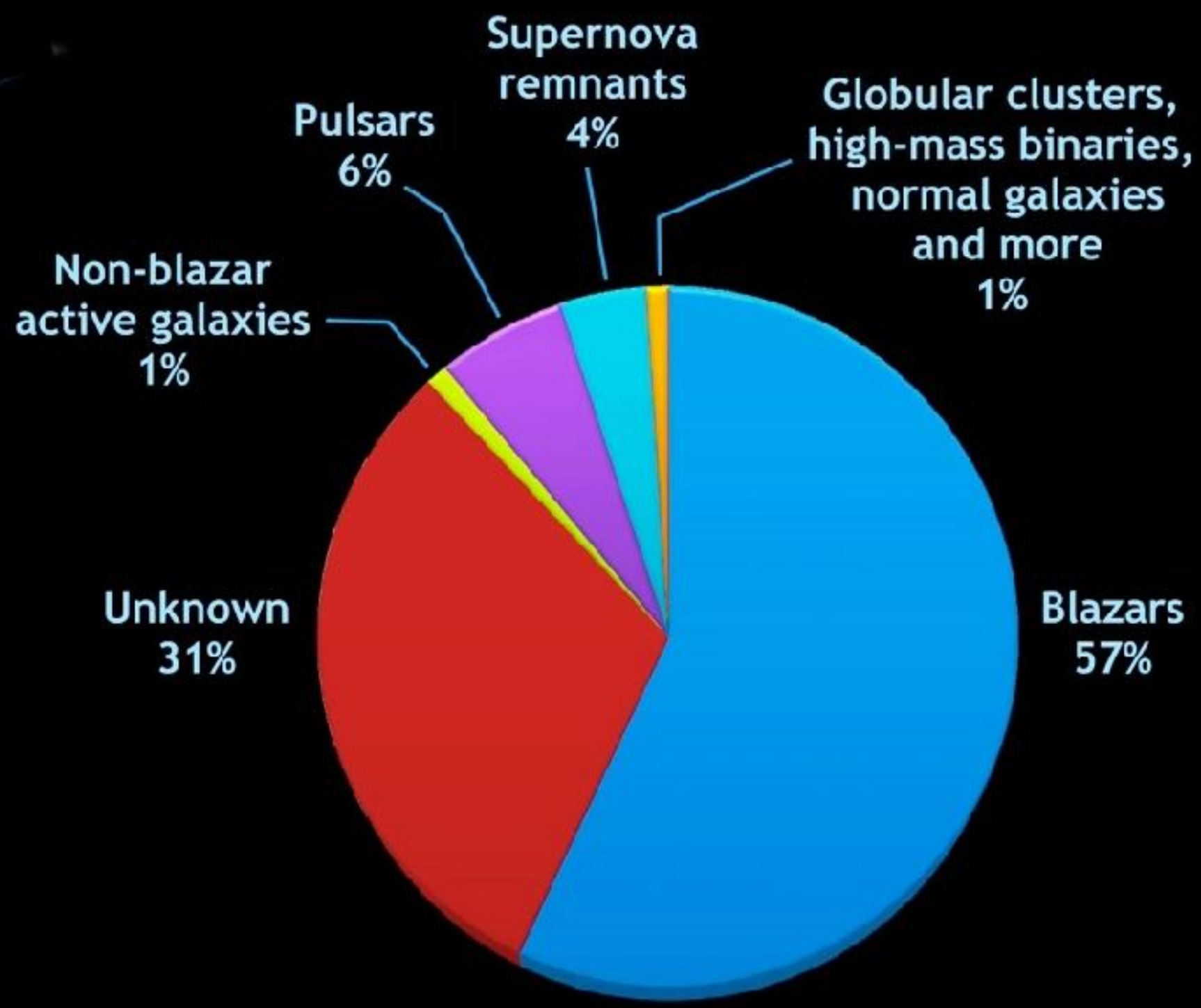


Energies 100 MeV - 300 GeV

Bühler+15

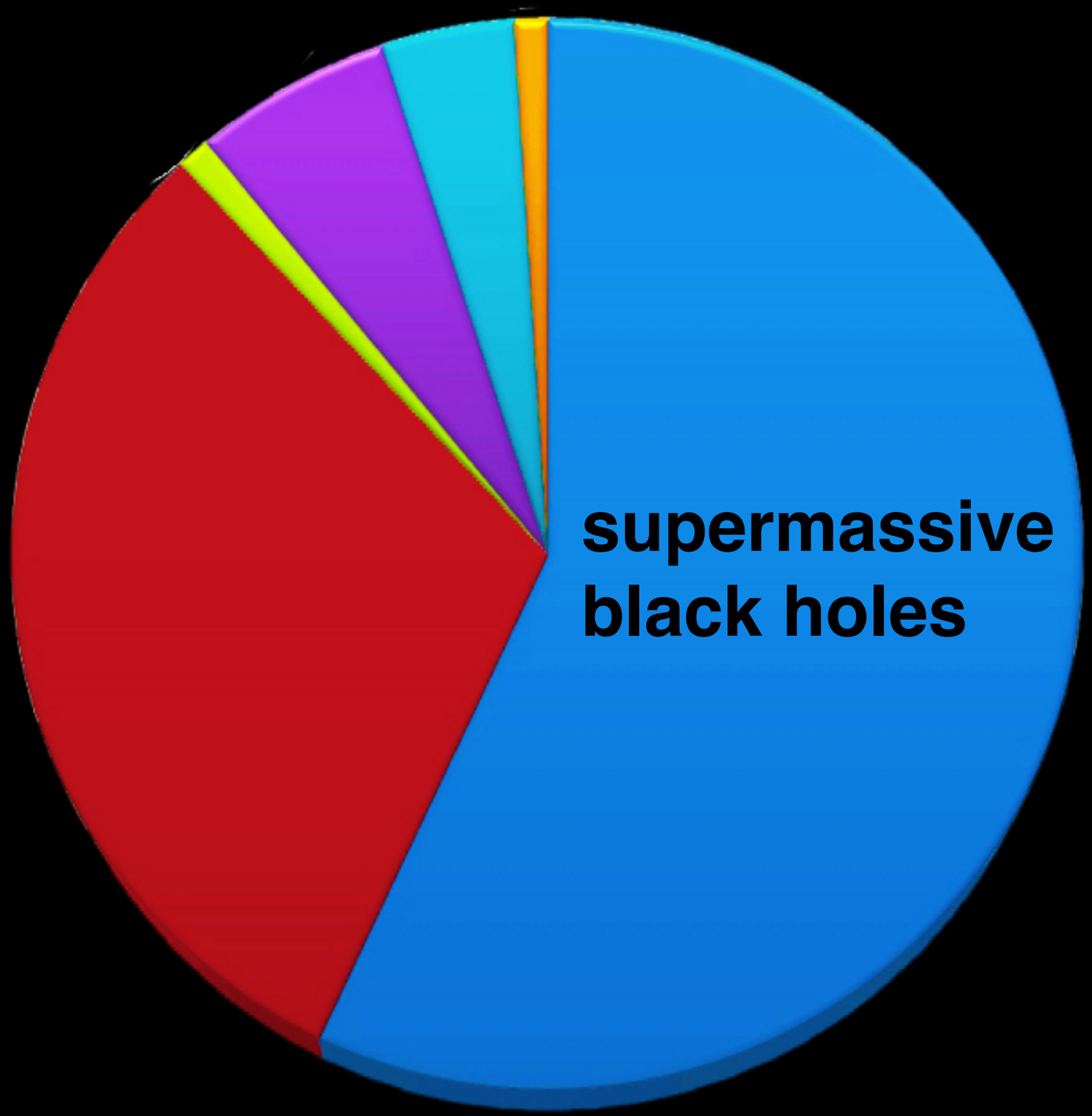
R. Nemmen: *Fermi* Telescope

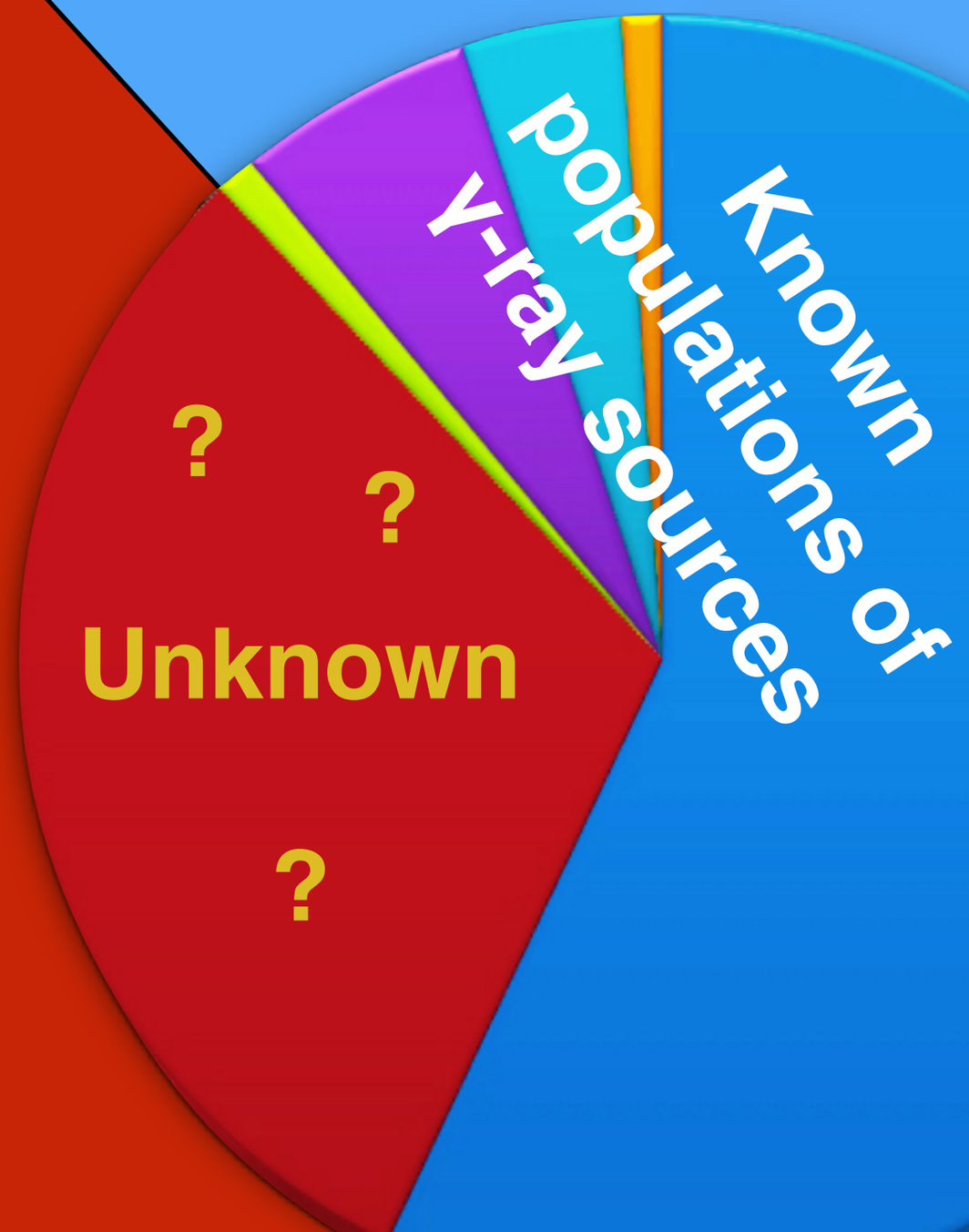
≈60% of gamma-ray sources are *black holes*



Acero+15

≈60% of gamma-ray sources are *black holes*

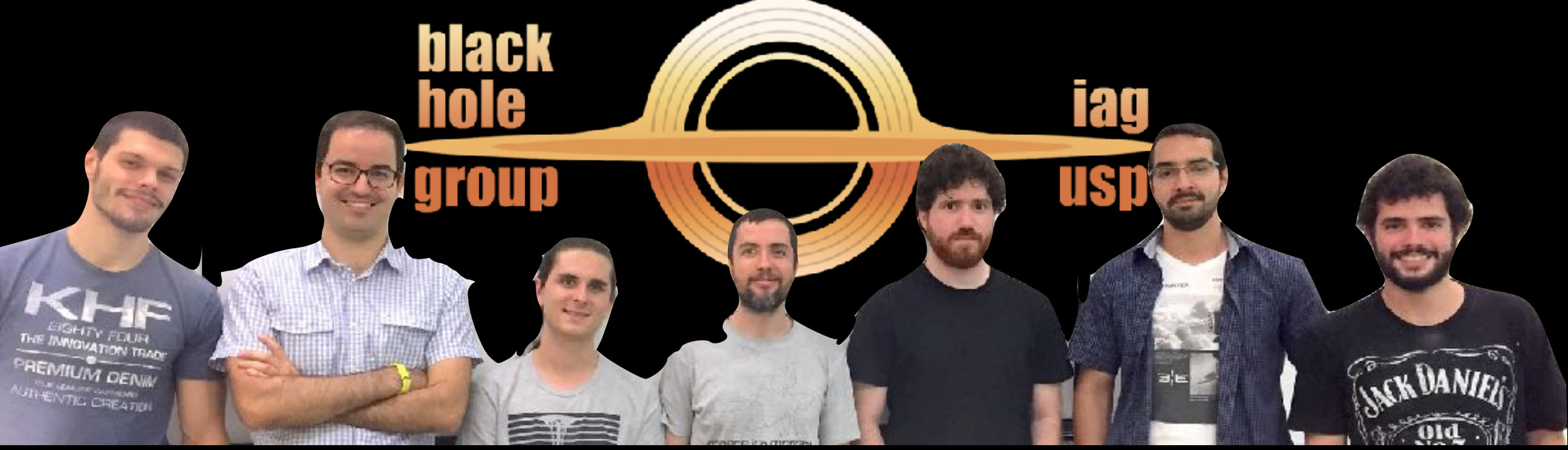



Known populations of sources
Y-ray
Unknown
?
?
?

1/3 of gamma-ray sources are unknown

Our activity: Analysis of *Fermi* Telescope observations of a black hole

- ☑ DOWNLOAD PHOTONS OBSERVED BY THE FERMI TELESCOPE FROM NASA
- ☑ PROCESS AND SELECT PHOTONS FOR SCIENTIFIC ANALYSIS
- ☑ PLOT GAMMA-RAY IMAGE OF SUPERMASSIVE BLACK HOLE (BLAZAR) USING PYTHON TOOLS

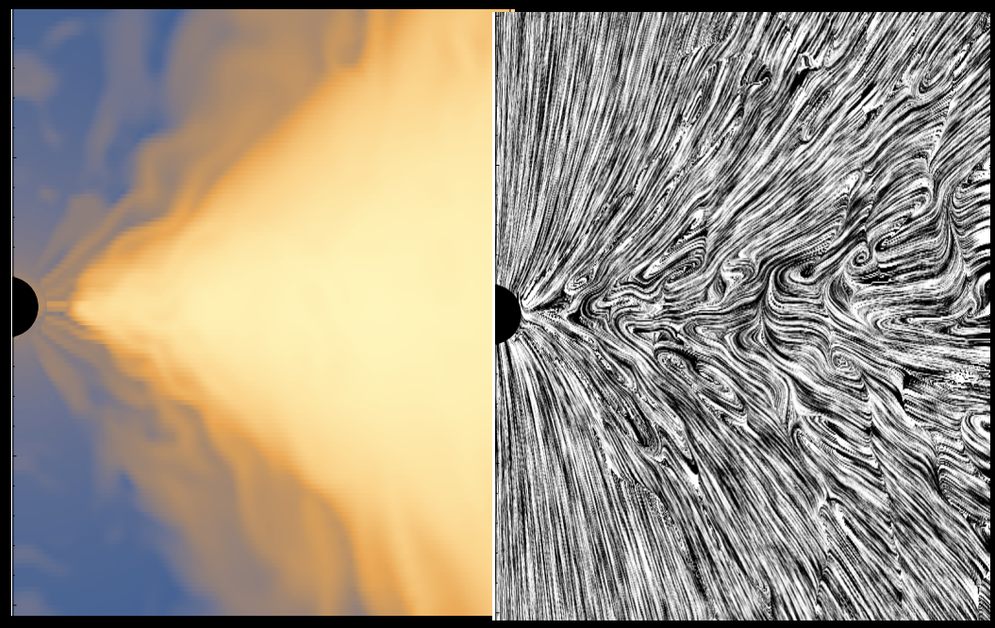


Black hole theory / simulations
observations

AGNs / stellar mass BHs / GRBs

High-energy astrophysics

Gamma-ray astronomy



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