

Search for Axion Domain Walls using the **G**lobal **N**etwork of **O**ptical **M**agnetometers for **E**xotic physics searches (**GNOME**)

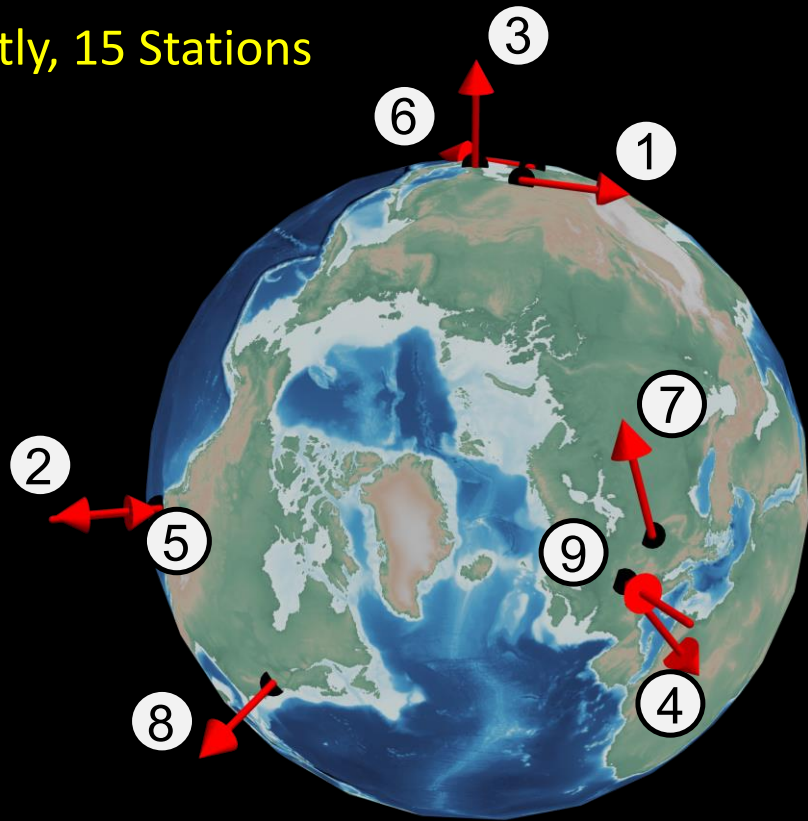
Hector Masia Roig and Joseph Smiga
for the GNOME collaboration



The Global Network of Optical Magnetometers for Exotic physics

Oberlin, Canberra, Belgrade, Jena,
Stuttgart, Los Angeles

Currently, 15 Stations



1. Beijing, China

2. Berkeley, USA

3. Daejeon, South Korea

4. Fribourg, Switzerland

5. Hayward, USA

6. Hefei, China

7. Krakow, Poland

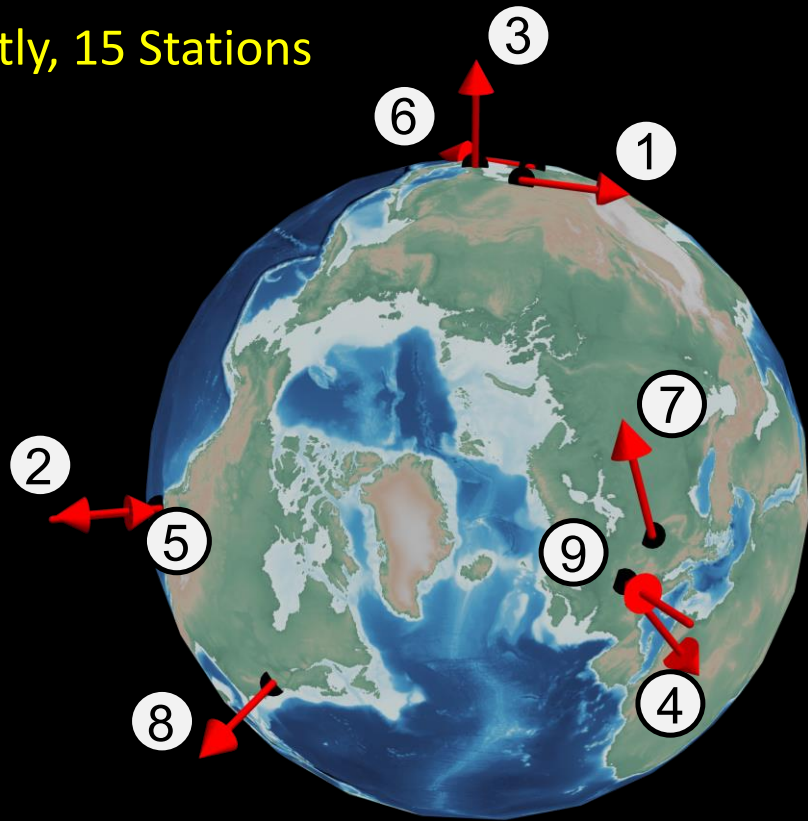
8. Lewisburg, USA

9. Mainz, Germany

The Global Network of Optical Magnetometers for Exotic physics

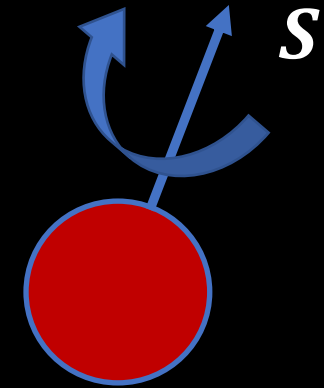
Oberlin, Canberra, Belgrade, Jena, Stuttgart, Los Angeles

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$$H_{int} \sim \mathbf{S} \cdot \nabla a(\mathbf{r})$$



Exotic spin interactions

Axion like particles (ALP)
Compact dark Matter objects

- ALP Domain Walls
- ALP Stars

ALP field features

- Burst astrophysics
- Continuous oscillations
- Stochastic behavior

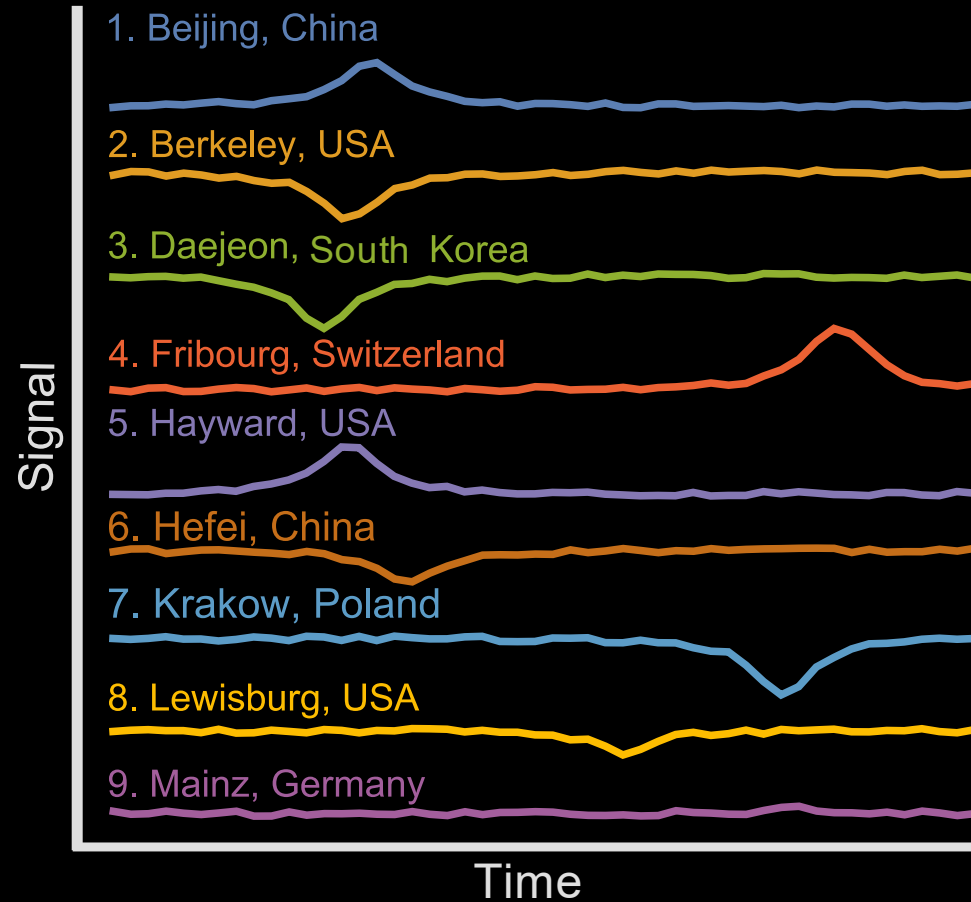
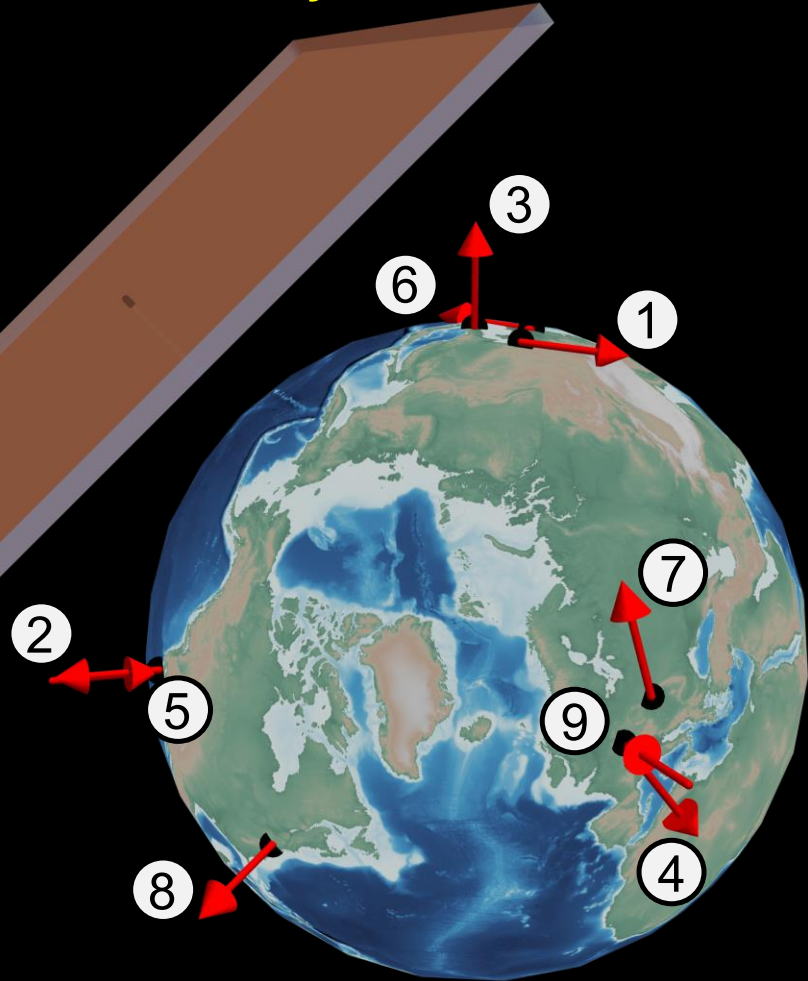
ALP Domain-Wall signature

Pospelov et. al., Phys. Rev. Lett., 110, 2, 021803, 2013

Network
time-series

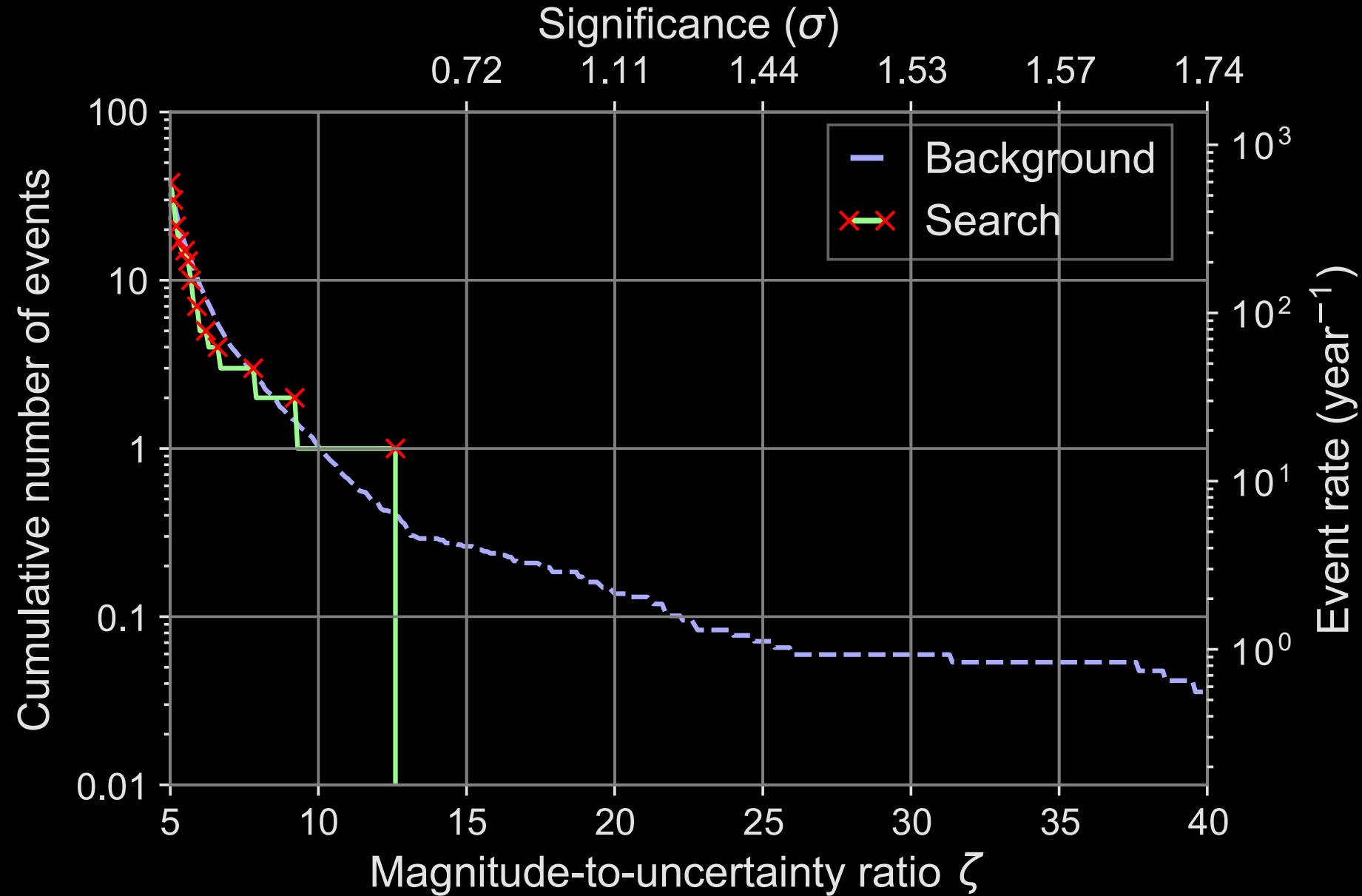


Domain Wall
- Magnitude
- Velocity
- p-value



Data analysis

S. Afach et. al., 2021, 2102.13379, arXiv

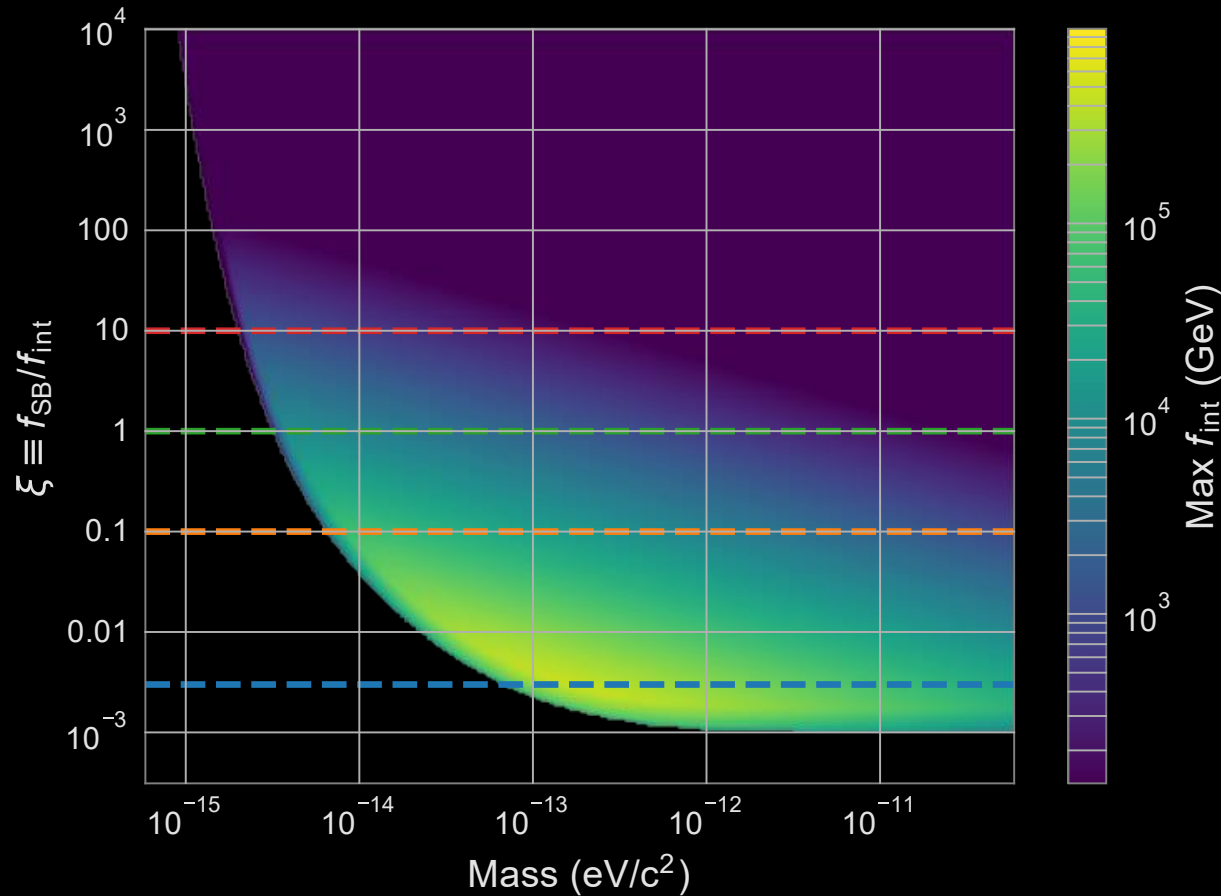


No significant signal found

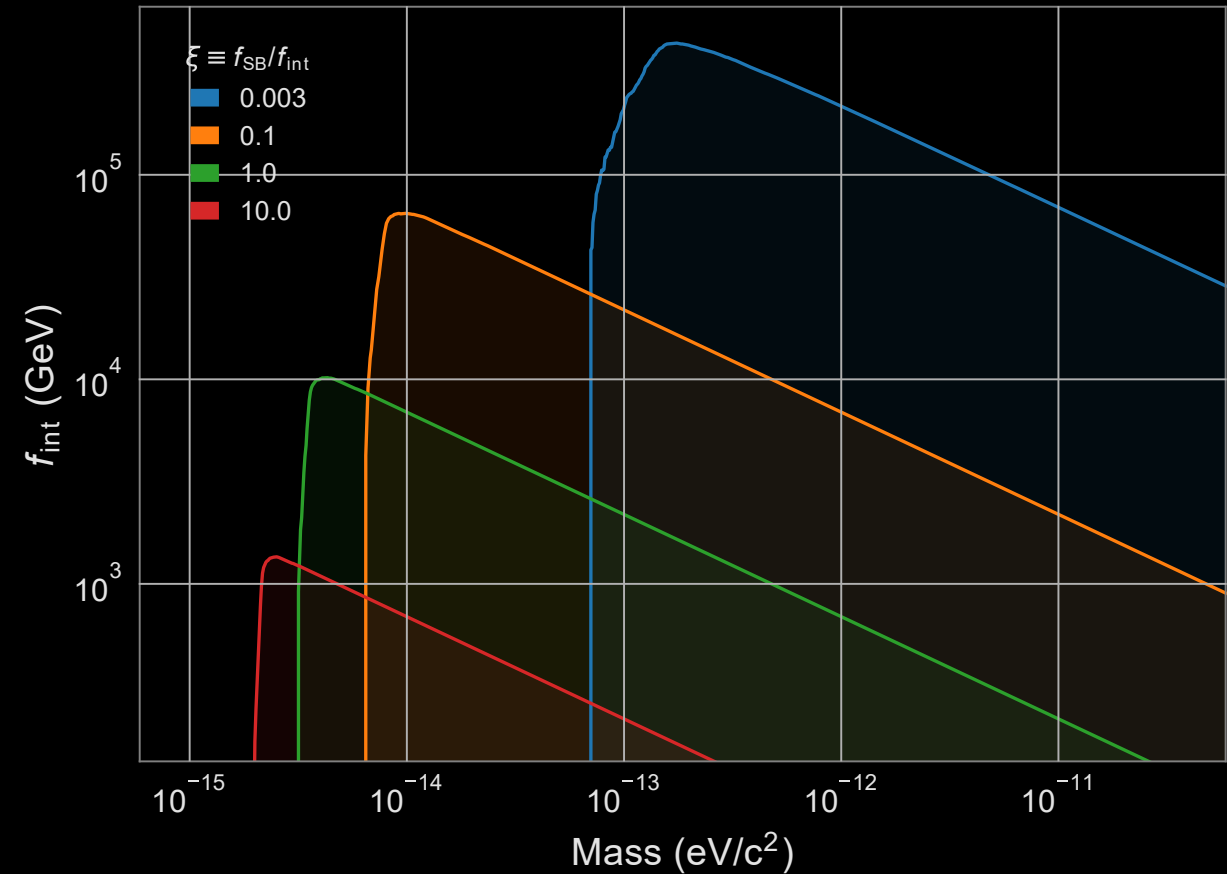
One month measurement

ALP constraints

S. Afach et. al., 2021, 2102.13379, arXiv



- Symmetry breaking scale
- Coupling constant
- Mass



- Very specific model
- Complementary constraints
- GNOME is searching for Dark matter!

Thanks for your attention

<https://budker.uni-mainz.de/gnome/>

