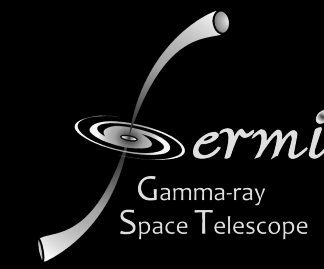


EXECUTIVE SUMMARY: SEARCH FOR AXION-LIKE PARTICLE INDUCED γ -RAY BURSTS FROM CORE COLLAPSE SUPERNOVAE WITH THE FERMI-LAT

[PRL, VOL. 124, 23, 231101 (2020), [ARXIV:2006.06722](https://arxiv.org/abs/2006.06722)]

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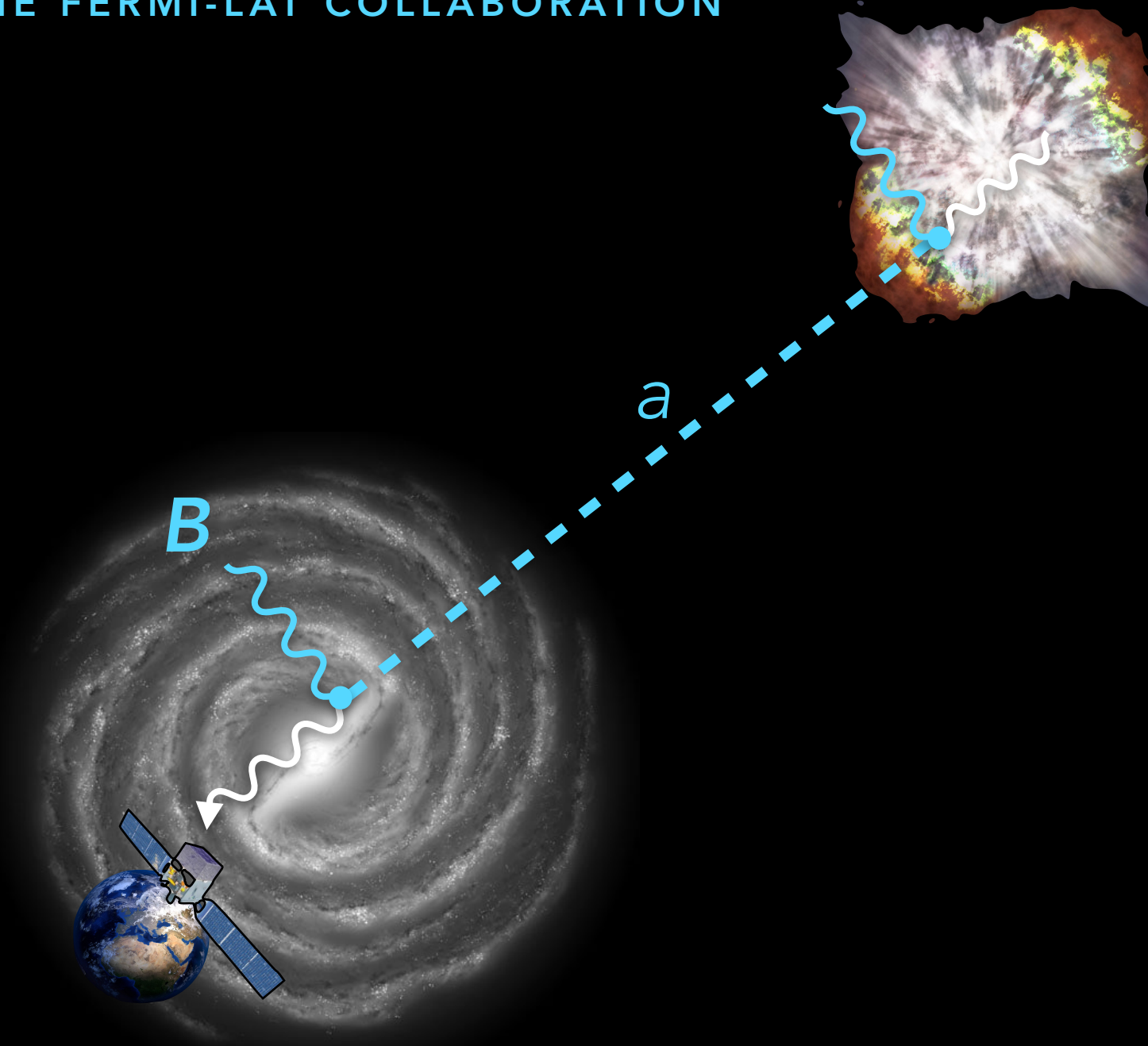


What is it about?

- Search for an **axion-like-particle (ALP) signal** with the **Fermi Large Area Telescope (LAT)**
- An **ALP burst** could be produced inside **core collapse supernova (SN)**
- The **ALPs could convert to gamma rays** in magnetic field of the Milky Way

Why is it interesting?

- ALPs are light (masses $< eV$) **dark matter candidates**
- Much of ALP parameter remains **unexplored**
- **Growing number of SNe discovered with optical surveys** (ASAS-SN, ZTF, soon: Rubin observatory) increases number of search targets



What have we done?

- Selected a **sample of Type Ib/c SNe with well sampled optical light curves to estimate the core collapse time** (core collapse time given by neutrinos, however, neutrino telescopes not sensitive enough to detect signal outside of Milky Way)
- Searched for **gamma-ray signal within most likely core collapse time window**

What is the result?

- **No signal found**, set limits on photon-ALP coupling
- Limits within factor of 5 of limits derived from SN1987A
- **Sample will increase in the future**, already identified 15 SNe observed with ZTF that were not included in original sample
- With SNe detected with Rubin observatory, **possible to reach sensitivity to probe ALP dark matter**

