



## 2026 Helmholtz – OCPC – Programme for the involvement of postdocs in bilateral collaboration projects

### PART A

**Title of the project:**

Modelling Hadronic Gamma-Ray Emission from GRB Afterglows

**DESY Division & Group:**

AP-THAT

**Project leader/supervisor:**

ANDREW TAYLOR

**Web-address:**

[https://astroparticle-physics.desy.de/research/theory/index\\_eng.html](https://astroparticle-physics.desy.de/research/theory/index_eng.html)

**Programme Coordinator (Email, telephone and telefax)**

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**Description of the project (max. 1 page):**

The detection of very high energy gamma-ray emission was successfully achieved for the first time in 2018 by the HESS collaboration. The nature of this emission, however, remains unclear. Models presently exist for it to be either leptonic or hadronic in origin. This project intends to investigate more deeply the hadronic emission scenario, with the aim of providing new observational tests for discriminating between the leptonic and hadronic emission scenarios. The research will take advantage of the AM3 modelling package that the THAT group has developed and released in the last year. This package provides a single framework in which these emission processes are fully described, allowing the research focus to be instead on the description of the material profile, into which the explosion propagates into and subsequently decelerates, to be developed. The project will take advantage of the gamma-ray burst afterglows observational data sets provided by both the HESS and LHAASO collaborations.



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**Description of existing or sought Chinese collaboration partner institute (max. half page):**

Nanjing University is a long standing collaboration institute of DESY, with many PhD students having been exchanged between the DESY Zeuthen and Nanjing University over the last 5 years. The institute is also a member of the LHAASO gamma ray observatory, which has already successfully detected TeV gamma-ray burst afterglow emission. The theme of the research project sits on a common interest of the two groups, which have previously both worked independently on gamma-ray burst models. The project offers the opportunity to bring together the strengths of the two research group efforts on this topic. In particular, the project will benefit from the strong observational analysis techniques offered by the Nanjing University group, and the strong theoretical modelling offered by AP-THAT.

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**Required qualification of the postdoc:**

<Sample text below>

- PhD in Astrophysics
- Experience with C++ & python
- Additional skills in simplified analytic models
- Language requirement- good English