**2018 Helmholtz – OCPC – Program**

**for the involvement of postdocs in bilateral collaboration projects**

**DESY\_OCPC\_2018-13**

**PART A**

**Title of the project:**  Gamma-ray astronomy with GPUs: transform the approach to Monte Carlo Simulations for the Cherenkov Telescope Array

**Helmholtz Centre and Research Group: DESY**

**Project leader: Gernot Maier**

**Web-address:** www.desy.de/cta

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

The Cherenkov Telescope Array (CTA) is the next-generation facility for high-energy gamma-ray astronomy. CTA will provide a deep and unprecedented insight into the no-thermal universe. DESY at its location in Zeuthen is among the leading institutions in CTA, coordinating the work packages structure of the medium-size telescope, array control software and is contributing significantly to data analysis and Monte Carlo pipelines. The main physics topics at DESY are the origin of cosmic rays and the nature of dark-matter particles.

The optimisation of the CTA telescopes during construction and for physics analysis need large sets of Monte Carlo simulations requiring significant computing resources using thousands of CPUs (CTA used about 150 MHS06 CPU hours in 2017). This project aims to use parallel computing on Graphical Processor Units (GPUs) to accelerate the simulation of the Cherenkov photon production and propagation in Earth’s atmosphere by a factor of one hundred or more. The candidate would develop and test the efficient implementation of the Monte Carlo simulations on GPUs. Groups at DESY provide experience in GPU processing, which are used routinely now in another astroparticle project (IceCube). The successful realisation of this project would have significant impact beyond CTA, as it allows the currently operating instrument (H.E.S.S./MAGIC/VERITAS) to significantly decrease the systematic uncertainties due to improved simulations.

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

**Required qualification of the post-doc:**

* PhD in Physics & Astronomy
* Experience with software development and Monte Carlo Simulations
* Additional skills in programming of GPUs

**PART B**

**Documents to be provided by the post-doc, necessary for an application to OCPC via a postdoc-station:**

* + Detailed description of the interest in joining the project (motivation letter)
  + Curriculum vitae, copies of degrees
  + List of publications
  + 2 letters of recommendation
  + Proof of command of English language

**PART C**

**Additional requirements to be fulfilled by the post-doc:**

* Max. age of 35 years
* PhD degree not older than 5 years
* Very good command of the English language
* Strong ability to work independently and in a team