

Joint Statement and Recommendations

DESY APC+PRC Meeting, 15/16 November 2022

1. Introduction and general findings

- APC and PRC had a very productive common meeting over two days, with a focus on the **topics of gravitational waves (GW) and dark matter (DM)** theory and experiments. The discussions covered the scientific motivation and potential of experiments and approaches, technological opportunities, and generally new scientific ideas. GW and DM are among the most pressing fundamental questions in physics today. Both fields are also part of the Quantum Universe excellence cluster in Hamburg.
- In the **field of DM**, there are world-class complementary efforts in both the AP and the FH division, e.g. the indirect searches in astroparticle physics, collider-based searches, and theory.
- The **theoretical activities in GW physics** are world-leading.
- APC and PRC observe that DESY has **relevant technological expertise** that could be useful for gravitational wave physics experiments, including the Einstein Telescope (vacuum, optics, lasers, mirrors, system control, ...).
- The committees discussed the **local experimental axion physics programme** in Hamburg as well as high-frequency (HF) GW opportunities connected to or based on this programme. This programme is considered to be unique and promises outstanding results for moderate cost.
- The **Einstein Telescope (ET)** offers unique science (and discovery) potential in astrophysics and particle physics. Site-specific studies are already ongoing in Lusatia, which DESY may propose as candidate experiment location.
- The committees congratulate DESY on its strong role in getting the **German Centre for Astrophysics (DZA)** approved. The centre offers numerous strategic opportunities, even for parts of the HF GW programme discussed for Hamburg.

2. Shorter-term strategic considerations and recommendations

- **Scientific discussions** between the divisions on the topics of GW and DM should be maintained.
- DESY should continue to coordinate the **site-specific studies for ET** in Lusatia.
- DESY should foster the existing axion programme and consider leveraging it for local HF GW experiments. In general, the **synergies** between the axion programme, the ET activities, and the high-frequency GW experiment ideas **should be strengthened** (technical, computing, ...).
- Beyond the site-specific studies, the construction responsibilities and **opportunities of ET** for DESY need to be better understood, in collaboration with project partners.
- DESY should **engage strongly in the setting up of the DZA** in order to ensure that the centre can fulfil its mission.
- DESY should explore whether more cooperation on the **data analysis side in the field of dark matter** could add value.

3. Longer-term strategic recommendations

- The opportunities in **gravitational wave physics with ET** should be eagerly pursued, making use of the extended expertise at DESY with relevance for GW experiments, also in view of strengthening the German community and its contribution to ET
- The **relation of DESY and DZA** needs to be well understood so that the two centres can develop a common vision for their respective roles in astronomy and astroparticle physics in Germany.

- The efforts on dark matter (e.g. LHC, CTA, on-site axion programme, ...) should remain a strong focus of the future strategy of the laboratory. A potential extension of the local axion programme to a HF GW physics programme could be a part of it.