

# KUMAR AKHIL

Dear Hiring Committee,

Let me begin straight away why I am not only a strong match with the role, but also a substantial head start. I have already developed a robust, tested, simulation and design framework that can be directly adapted to Tuneable Magnet (TM) actuators mentioned in the description of your project as a part of my PhD research, specifically within the [Einstein Telescope](#)(ET), a 3rd generation gravitational wave detector.

At the University of Antwerp, within the framework of the [ETpathfinder](#) (, a research facility for ET), I've been fully involved in the modelling, prototyping, testing, and production of position sensors (LVDTs) and voice coil actuators for cryogenic and ultra-sensitive environments. These systems push the limits of energy efficiency, stability, and precision, and deal with noise and control non-linearities, that are central to the goals of your project.

Some key aspects of my work that align with the objectives of your project:

- Developed and validated a model for electromagnetic actuators, which is modular and can be adapted to tuneable magnet configurations.
- Built experimental setup and test bench to characterize actuator performance under dynamic and static conditions.
- Up to date with global actuator technologies across various sectors that could directly inform your design approach.

Beyond the technical expertise, I have experience working in large collaborative environments with an international team. I've worked independently and as part of a team and also co-supervised Master's theses focused on sensor characterization & shielding in noisy environments, one of which explores transverse displacement effects in LVDTs, closely related to motion control challenges in your project. I understand how to manage documentation, procurement, integration, and experimental control in R&D heavy environments.

The optimization framework I developed to improve the sensor's design led to a >350% performance improvement compared to the existing design, an outcome now being prepared for peer-reviewed publication. Along with that, I am currently writing another paper based on this work, and although they are not been published yet, I'd be happy to share the results or data. I would gladly offer a live demo to illustrate how my actuator modelling framework can be useful for your TM actuator project.

This postdoc opportunity aligns deeply with my background and ambitions. I am excited by the chance to contribute meaningfully to your research with real-world impact.