



PhD Project

Title: Search for an axion light particle in the flavor violating $K^+ \rightarrow \pi^+\pi^0 a$ decay at the NA62 experiment.

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The axion is widely thought to be among the best-motivated additions to the Standard Model, providing a solution to the strong CP problem and being a possible Dark Matter (DM) candidate. For general axion models, the discovery potential of flavour physics experiments is in general not competitive with respect to astrophysical probes; the opposite is true for axiflavor models. For the vectorial coupling of axiflavor to quarks, the Kaon factory NA62 at the CERN Super Proton Synchrotron (SPS) can probe the DM window, a unique feat among particle physics experiments. However, an experimental effort to measure the corresponding axial-vector coupling at current experiments is, to date, lacking.

NA62 collected the world's largest sample of K^+ decays to date (Run1) and resumed the data taking in 2021. The candidate will participate actively in the run, in the maintenance of the Ring Imaging Cherenkov detector (RICH) designed and built by the Firenze group and in data analysis.

In particular, the candidate will study the flavor violating $K^+ \rightarrow \pi^+\pi^0 a$ decay on the full NA62 dataset. In the spirit of having the most general search possible, a is any pseudoscalar particle with no hypothesis on the mass. He or she will develop the analysis code to select the decay of interest, study the background sources and assess the NA62 sensitivity. Advanced computing and machine learning approaches are encouraged.