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**Studies of the beam dynamic and a beam position monitor for the high energy beam transport lines of the MINERVA project**

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Location : IJCLab, Auditorium Pierre Lehmann, building 200

**Abstract :**

The MYRRHA ("Multi-purpose hYbrid Research Reactor for High-tech Applications") project aims to be the first demonstrator of an accelerator-driven system. It is part of research and development on the transmutation of highly radiotoxic wastes produced in existing reactors. Controlling the subcritical reactor requires coupling with a very high reliability an accelerator which deliver a proton beam at 600 MeV energy and 4mA intensity. In order to validate the accelerator requirements, a first phase called MINERVA ("MYRRHA Isotopes productioN coupling the linEar acceleRator to the Versatile proton target fAcility") is currently under construction at SCK CEN in Belgium. This project will also allow the scientific community to use the accelerated proton beam at energy of 100 MeV. The work carried out in this thesis falls within this context. Detailed design studies of the high energy beam transport lines positioned downstream of the LINAC are presented. These transfer lines, with a total length of around 120m, deliver the beam at nominal energy of 100 MeV and intensity of 4mA on three sites: an installation receiving a fraction of the proton beam dedicated to the physics, a full power beam dump device and a line dedicated to the qualification of the machine foreshadowing the future position of the LINAC and connected to the MYRRHA reactor. The design of these lines takes into account all the constraints set by the project. As part of this work, the studies focused on a beam position monitor. To this end, an analytical simulation tool was designed. It takes into account all the important parameters: the geometry of the BPM and the characteristics of the beam. We were able to compare this analytical tool with our experimental results carried out at the IPHI installations at CEA Saclay and at GANIL/SPIRAL2 in Caen. This allowed us to propose an optimized design of such BPM for the high energy lines of the MINERVA project.

**Link to the visioconference Zoom :**

[**https://ijclab.zoom.us/j/99066071626?pwd=cnhjMW42S1huZ0Ntb3ZFc2lhUTM5UT09**](https://ijclab.zoom.us/j/99066071626?pwd=cnhjMW42S1huZ0Ntb3ZFc2lhUTM5UT09)