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High Finesse Fabry-Perot Cavity for ThomX ICS as an X-ray Source

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Inverse Compton scattering (ICS) is a method used for X-ray production that has been possible in recent years due to the rapid development of ultra-fast, short, and stable oscillators. In addition, the research and development of high Finesse Fabry-Perot Cavities to store high average power inside it. ThomX is a new generation of compact X-ray source which implements the ICS method. It will produce higher flux and better quality X-rays than the traditional sources such as X-ray tubes and be cheaper and more compact than synchrotrons. ThomX is currently being commissioned in IJCLab (Laboratory de physique des 2 infinitis –Irene Joliot Curie) at the Orsay campus. It is composed of a linear accelerator that can accelerate the electron bunch up to 50 MeV, an electron ring to store it over multiple revolutions at 16.66 MHz, and a Fabry Perot cavity to maintain the photon pulse at 33.33 MHz. The first electron beam produced was in October of 2021, and then it had a full round in the storage ring in 2022. It is expected to produce x-rays in mid-2023 when its Optical cavity has power stored in it. It is a high Finesse Fabry-Perot cavity that can store up to 1 MW. Such cavities face many problems, from high power stability to heating up of their reflecting mirrors. Here, we will describe the optical cavity commissioning of ThomX and the challenges faced throughout the preparation for the production of X-rays.

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Footnotes

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