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ESRF Upgrade EBS Beamline Constraints and How They Were Respected

ESRF–EBS (Extremely Brilliant Source) is the ESRF's 150M€ facility upgrade, over 2015-2022, bringing its scientific users a first-of-a-kind, low-emittance, high-energy synchrotron light source and new, cutting-edge beamlines. With a revolutionary new storage ring concept that increases the brilliance and coherence of the X-ray beams produced by a factor of 100 compared to present-day light sources, ESRF–EBS represents a new generation of synchrotron and an extraordinary new tool for scientists to study the heart of matter.
The key beneficiaries of this extensive upgrade are the ESRF beamlines. When the new machine was installed, in order to minimise the amount of work for everyone involved, it was decided to leave the beamlines that were already built, and upgraded over the first 25 years of ESRF operation in their 2019 positions.
The beamline alignment is defined by the X-ray source point in the machine, typically but not always the centre of the straight section, and the direction of the beamline with respect to the straight section in the machine. The decision to not move the beamlines required the new machine source points and beamlines direction were coincident with the ones in the old machine.
This paper will present in detail the alignment constraints mentioned above and how they were respected when the new machine was installed. We will also discuss the stability of the source points and beamline directions over time.

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