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Reference networks and coordinate systems for the alignment of Sirius accelerators and beamlines

During the construction of the building for the new Brazilian synchrotron light source, Sirius, several reference networks and coordinate systems were defined. The references used from the initial locations of the civil construction area were expanded, and the old coordinate system was maintained during all phases of the civil works. Also, different references were used depending on the phase of the project. After the main slab was concreted, due to structural motion of the building structure new references were installed on the radiation shielding and special slab. For the alignment of the Linac, a new reference network was installed inside its tunnel. The same occurred for the main tunnel, where approximately 1200 points were materialized with target holders, surveyed and adjusted to serve as a reference for the alignment of the components of the Booster and Storage Ring components. This paper deals with details about these coordinate systems and reference networks, from the point of view of management, establishment, survey and adjustment. Also, this work will describe the six degree-of-freedom transformations applied over time to coordinate systems adequacy. GNSS measurement campaigns for the central monuments used to georeferencing the building will be reported. In addition, this work will present the geometry of the reference network to be installed on the experimental hall, long beamlines, and the first experimental hutches. The issue of connecting those networks together and simulations to evaluate the networks in terms of measurement uncertainty will be reported.

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