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Design features and development of a personnel protection monitoring and interlock system for RF surveys with access to RF cavities at the ALS-U project at LBNL

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The ALS-U project at LBNL is major upgrade of the ALS involving a new Accumulator Ring (AR) and an upgraded Storage Ring (SR). Another overarching AR Personnel Protection System (PPS) is in place for personnel protection during normal beam operations. However sometimes we need to do RF leakage checks in AR RF cavity area with powered RF cavity below power limit and without beam. In this scenario termed as "RF Test With Access" mode, we must minimize exposure to potential X-rays from powered RF cavity exceeding prescribed dose rate limits. Such limit will be determined by X-ray survey at various RF cavity power levels. This paper presents the design features, requirements, circuit diagrams and implementation of such AR RF PPS system for RF power monitoring and interlock chain to turn OFF RF drive to AR RF HPAs if RF power exceeds limits in this mode. For high reliability, two redundant RF detector channels are used for each RF cavity power. Also SIL-rated Safety Trip Alarm (STA) devices are utilized to perform logic comparison with relay outputs interlocked with RF Drive chain. STA devices provides a failsafe state. All such design & development aspects are presented in this paper.

Footnotes

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