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Effects of Thyatron Aging on Klystron RF Pulse Stability

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The FERMI Free Electron Laser facility is based on a 1,5 GeV S Band linear accelerator. The facility operates for more than 6500 hours/year. The RF klystron modulators consist of high voltage pulse generators based on thyatron switched pulse forming networks and step up transformer technology. High output voltage stability from the modulators is required to meet the demanding specifications of RF amplitude and phase stability. An analysis of the klystron voltage stability measurement versus the RF amplitude and phase variations has been performed to evaluate the main possible contributions. Degradation of the behavior of the thyatron switch as the operating time of the tube approaches end of life has demonstrated to be one of the major reason of stability worsening with the increasing of the accumulated operation time of the plants

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