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PO23 - The Accelerator Operators role in making adaptive tuning effective.

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The LANSCE accelerator has been in operation since the early 1970's at the Los Alamos National Laboratory, in the past running up to 4 beams of different charge, current and flavors to 800 MeV. Much of this operation has been accomplished by iterative tuning following the primary physics tune that occurs initially at machine start up. Initially, physicists and operators utilize emittance measurements, phase scans, Delta-T measurements, wire scans and harp measurements to set transverse and longitudinal parameters to establish an initial tune. Following this, operators begin ramping current toward production levels while iteratively adjusting steering, phase and amplitude of the accelerator amplifiers as well as adjustment to the quadrupole settings to reduce losses and maximize transmission. This iterative process is expert based and informed by trial and error and is fraught with opportunities to degrade the broad tune space established by the earlier transverse and longitudinal tune establishment. We continue to explore why this initial physics tune is not more effective at establishing a tune that can be taken to full power without interference and strive to establish a more repeatable and reliable way of getting to production current levels without the expert based iterative tuning. In this talk, we will explore some of what has made tuning iteratively sustainable in the past but more importantly, look towards the prospects of machine learning and adaptive tuning algorithms and the promise of iterative methods that can be applied consistently and reliably and examine what role the beam operators play in implementing this methodology.

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