

Could more beamtime for this proposal be provided parasitically with other experiments?

Yes:

- *Data from other experiments can be used entirely parasitically to help pre-train the controller.*
- *“Active” tests can be done in short intervals (e.g. 10-15 minutes) during setup/tuning for other experiments or when experiments have short periods of unused time.*

How invasive is the diagnostic setup relative to other experiments?

- *For initial studies with LPS as target to control, it’s only invasive in that it would use the TCAV. Once the TCAV virtual diagnostic is in place, no invasive diagnostics would be needed.*
- *Data recorded on the TCAV during RL studies can aid TCAV virtual diagnostic training (E-327)*
- *In later stages after initial demonstration for the LPS, other target outputs that are already used in experiments could be incorporated in a way that is not invasive.*

Could the feedback be limited to a range that is relatively non-perturbative to other experiments that use related e-beam diagnostics?

Yes. We plan to do this in several ways:

1. *A tunable setting for what the allowed magnitude of input and (predicted) output changes are is included in controller training.*
2. *Direct restrictions (veto of changes over a certain magnitude) will provide an extra safety-check.*
3. *Controller uncertainty estimates will be included and used to tune how much risk the controller takes in selecting new settings.*