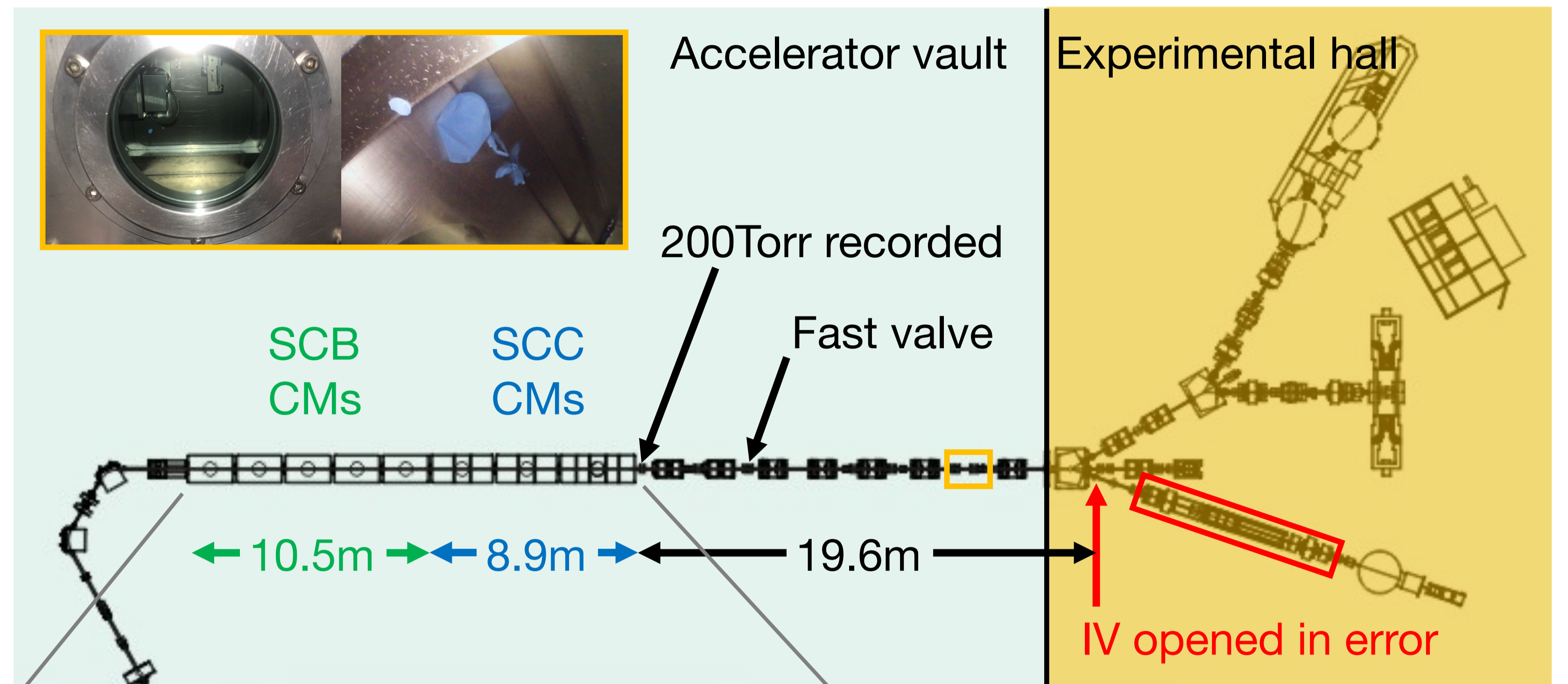


Performance of Contaminated Superconducting Linac After Vacuum Excursion

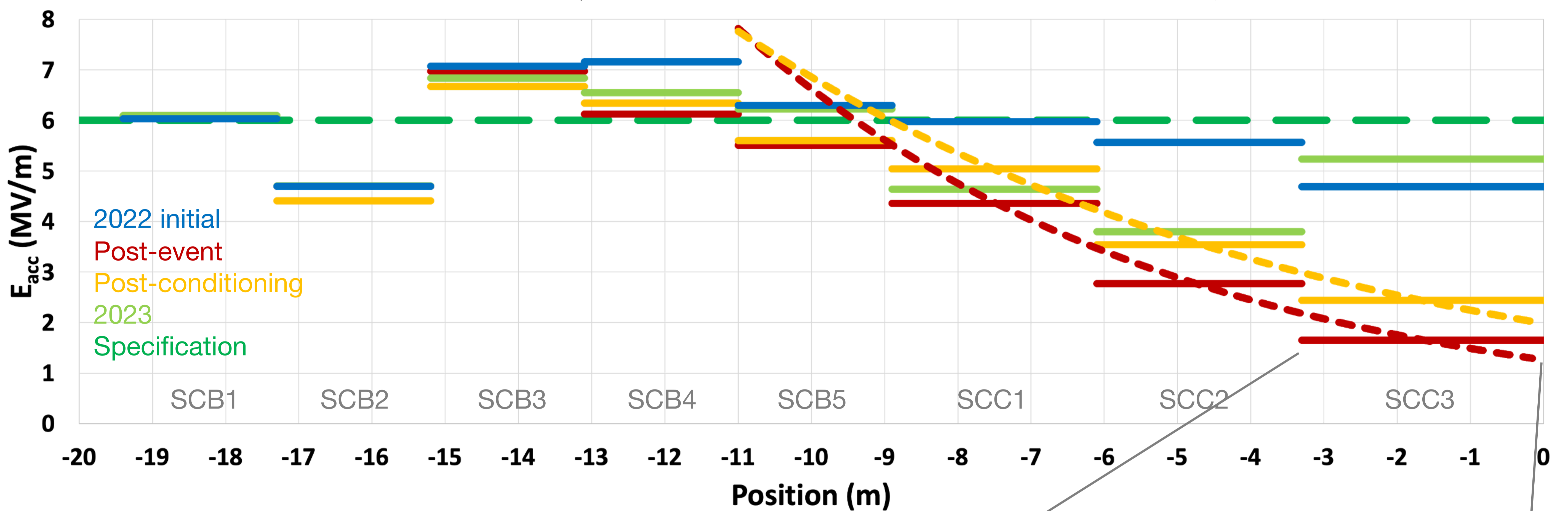
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Abstract

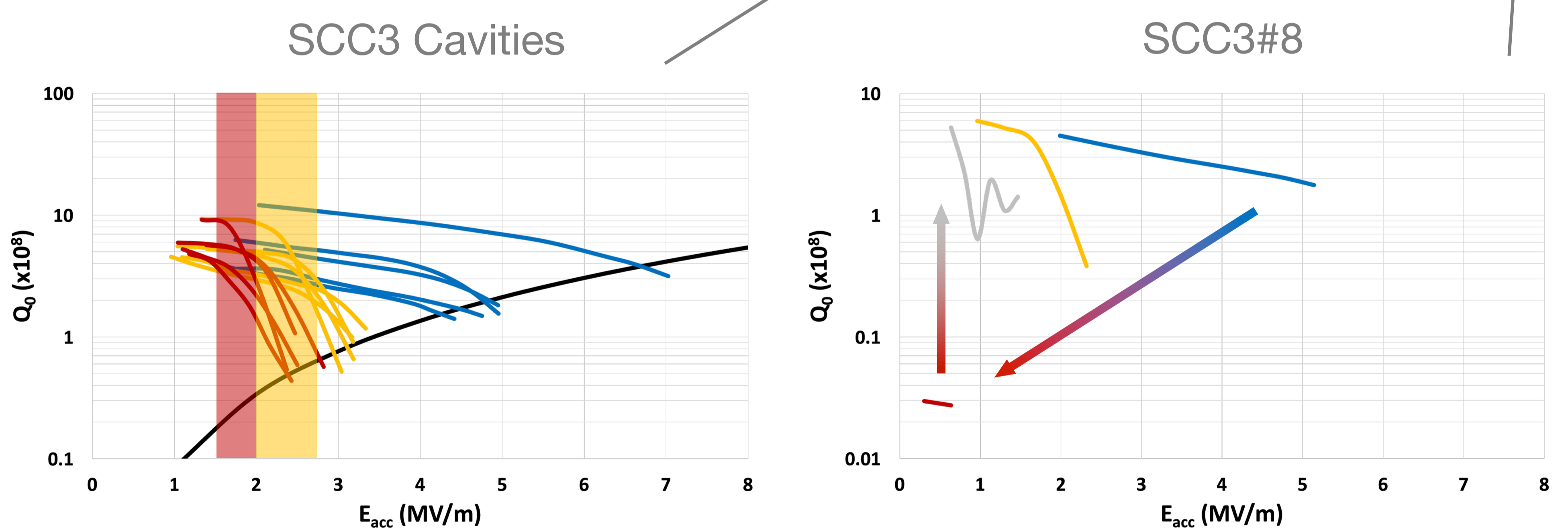
ISAC-II had a vacuum excursion caused by an operational error and the failure of the fast protection system in summer 2022. The beamline downstream to the SC linac was vented with atmosphere air from the experimental hall resulting in pollution of the linac. This poster reports the RF performance of the contaminated linac. The typical cavity performance changes, the average magnitude of degradation, the impact range in the SC linac, the observations in the recovery processes and the analyses on the most distinct cavity are discussed. The cavity refurbishment in the recent winter shutdown with the observations and outcomes is also reported. The ISAC-II event provided a unique data set for the SRF community.



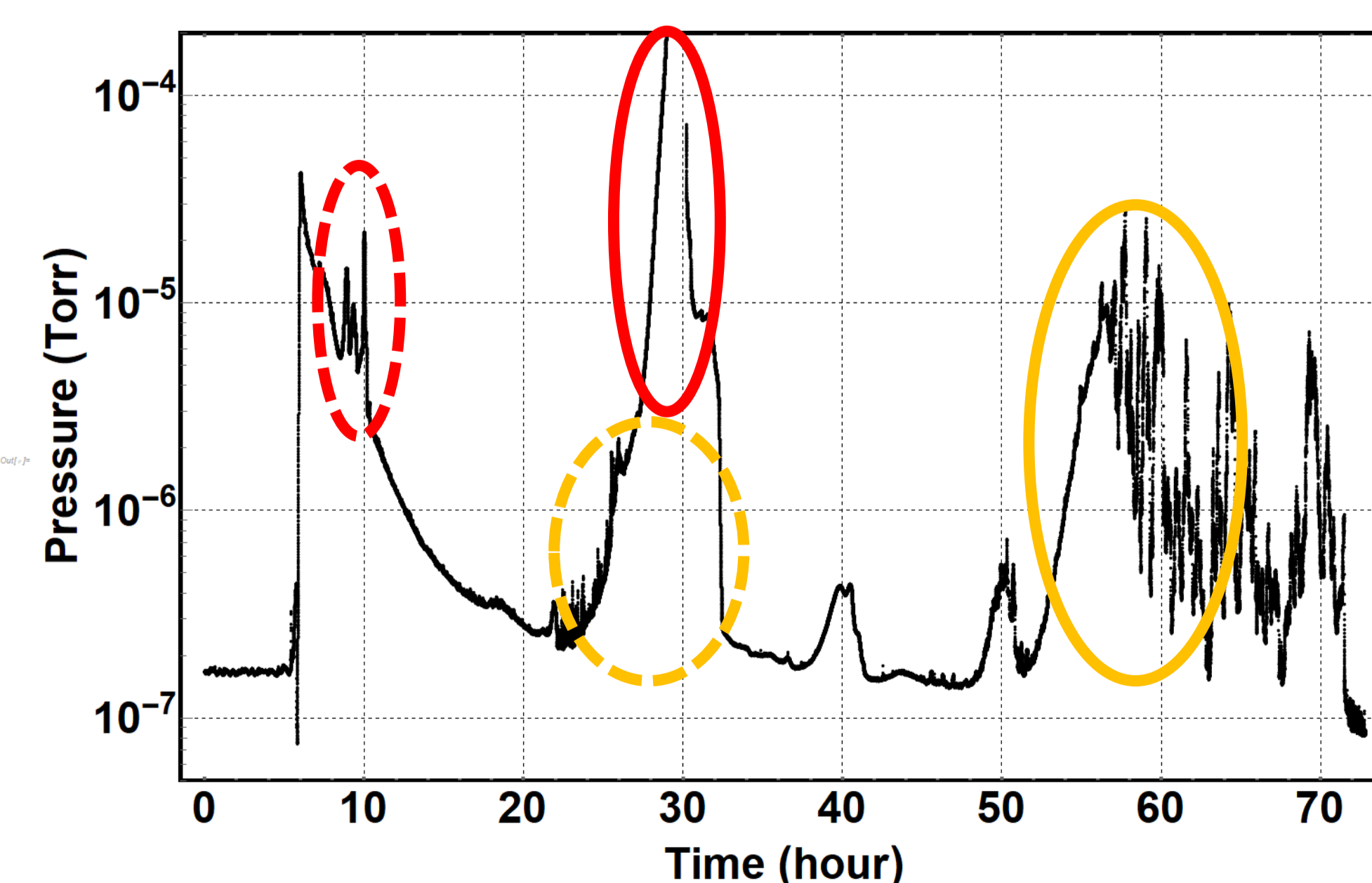
Linac Performance (Average E_{acc})



- SCC cavities were impacted with reduced FE onset levels.
- Degraded average performance had exponential relation with distance to pollution source.
- Particulates migration range for this event was ~ 9m in ISAC-II.
- Multipacting was enhanced on cavities within ~ 1.5m.
- Dielectric RF loss of condensed air caused severe Q degradation of SCC3#8.
- SCC3 CM was refurbished. HPR restored cavity performance.
- Did not find visible debris on RF surface of cavities.
- Protection system and operation procedure have been updated.



Outgassing in 300K Thermal Cycle



25K – 35K: sublimation of solid nitrogen and solid oxygen*
 150K – 180K: sublimation of solid H₂O*
 *in pressure range of 10⁻⁷ torr – 10⁻⁴ torr

Solid: solenoid
 Dashed: cavities, helium reservoir or liquid nitrogen shield