Towards SPS GF PoP Experiment

Summary and next steps.

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with many thanks to everyone else on the very enthusiastic team!
Main outcomes

• Foresee deterministic scanning and data logging of the parameter space \((x,y,t,\gamma)\). Ranges still to finalise, but conceptual work on controls architecture and implications can already start – manpower could be an issue. Strong link to detector performance and integration time.

• Atomic physics starts being really interesting if \(10^{-5}\) absolute energy calibration of the resonance can be obtained -> look with SPS team at energy stability and calibration

• Investigation of other isotopes and transitions ongoing (source) – keep thinking of clever ways to reduce systematics on absolute resonance energy

• Photon fluxes simulated and cross-checked, maps and energy distributions available for any location downstream IP as a function of radius to define detector requirements

• Cooling still looks feasible, better for shorted ion bunches
Main outcomes

• Big uncertainty on the background for Xray detector, also no expertise at CERN for these detectors. Detector concept is a key point to advance on now. X-ray detector location should be at least 10m downstream the IP

• Interest to try and look again at extracting the ’core’ X-ray photons from the vacuum chamber, will revisit the orbit bump schemes

• Impedance should not be an issue but need to look at whole vacuum sector

• Agreed to add 2 BPMs either side of cavity for ensuring ‘day-zero’ spatial overlap.

• Laser system and FP cavity concept advancing, questions on controls interface (FESA). Information needed now on synchro scheme, alignment and tunnel environment (temp, humidity, vibration). Check integration cross-section.
Main outcomes

• Transport high pulse energy in air, lower power pulse in fiber.
• 90deg scheme with 532 nm laser to investigate as backup, also may open new possibilities. Will cross-check photon production.
• For radiation to electronics, looks like levels during experiment operation could probably be OK (tbc), but risk from p+ operation is high -> design experiment to allow laser & key electronics to be installed after p+ operation in a 24h slot?
• Can profit from existing radiation-resistant development (LHC triplet alignment) and RWG database of components. Also need to look at pressure around ring to get local losses.
• RF – laser synchro will be based on AWAKE solution, but with variation of the frequency which adds complication, need to develop the draft FS
Deadlines: phase 1

- Detailed Proposed: End June/July 2019 (~6 months)

Fig. 1: The timeline of the Gamma Factory Initial Study, Phase 1 activities – years 2016–2019.
Deadlines: phase 2

• Systems ready for installation: End December 2021 (30 months)
• Beam tests: 2022 and 2023
Concluding remarks

• Great progress, even since Krakow meeting which was not so long ago
• Yellow Report – need to fill in the remaining PoP sub-chapters and maybe review the layout
• Next meeting planned in LAL Orsay June 3-7.
• Deadline for finishing the YR - before Granada?
• Deadline for “detailed proposal” - planning, costs, manpower?

• Thanks to everyone for the great efforts and the enthusiasm!