# Proposal for LARP2

LARP group in BNL CAD May 20, 2016



LARP/HiLumi CM26 - Spring Collaboration Meeting, May 18-20, 2016 SLAC

### Who we are

The LARP group members at BNL/C-AD have worked in large variety of superconducting and normal conducting RF cavities RF Design, Prototyping & Testing

- for *various projects* (RHIC 56 MHz, LeREC, eRHIC CCs, CABOTO, SPARC)
- in *collaboration* with CERN, ANL, FNAL, Jlab, Cornell, Cockcroft Institute, KEK, INFN, IFIC, etc.



## **HL-LHC** Crab cavities

#### <u>Activities:</u> necessary activities not part of construction

- 1. Participation in *SPS beam tests* (MDs at CERN) to:
  - understand *performance of crab cavities with beams*,
  - identify possible changes required for pre-series and,
  - identify possible *improvements* (manufacturability, cost) for pre-series.
- 2. Support for *integration and qualifications* of HL-LHC crab cavities at CERN
- 3. Beam *commissioning and early operations*, coupled with beam dynamics studies
- 4. Further *studies for HL-LHC crab cavities*, e.g. DQW CC for *horizontal kick*
- 5. Collaboration meetings, planning and HL-LHC related meetings

FT: 1 - 400k/year

<u>Collaboration</u>: BNL, FNAL, LBNL, SLAC.



# Superconducting RF

→ We believe we can *expand beyond the previous crab cavity scope*.

<u>Activities</u>:

#### **Accelerating Cavities**

- Coupler design for cavities with high-intensity beams (FPCs, HOMs)
- 200 MHz accelerating cavities for Hi-Lumi LHC

#### **Deflecting Cavities**

- Explore application of new generation of deflecting cavities (light sources, electronion colliders, beam injection-extraction)
- → Benefit both *Hi-Lumi LHC upgrade and US facilities* (EIC, future light sources, etc.)

Synergies: crab cavities for FCC

Collaboration: BNL, LBNL.

FT: 0.2



### eLENS

#### BNL/C-AD has an *operating eLENS system in RHIC*, providing:

#### • Unique data pool

Gained experience with hadron and proton beams is a unique data pool for developing future eLENS systems for LHC.

#### • Dedicated experiment time $\rightarrow$ test bench

Our current eLENS system also has dedicated experiment time every two weeks during RHIC operation, and can be used a test bench for beam collimation and beam-beam compensation studies.

#### <u>Activities:</u> eLENS experimental studies

- Collimation studies with hollowed electron beam.
- Beam-beam compensation.

<u>Collaboration</u>: BNL, FNAL.

FT: 0.3



# Thanks for your attention

Questions, comments?

6



### Who we are

#### Competences: RF Design, Prototyping & Testing

- Design optimization of RF cavities, both RF and mechanical
- Design of HOM filters for SRF cavities
- Beam-cavity interaction
- Experience with different codes for RF design and studies (CST, HFSS, ACE3P) and engineering studies (ANSYS)
- Bead pull measurements
- RF testing (high-power normal-conducting cavities, SRF cavities)
- Cavity assembly in clean room environment
- Preparation for LLRF for testing of RF cavities
- Experience with fabrication of RF cavities
- Establishing procedures for surface treatment of SRF cavities
- Definition of tuning strategy for SRF cavities, evaluation of tuning sensitivity and frequency shifts.
- Multipacting studies
- Experience working in international collaborations (HL-LHC, CLIC, PARTNER)

