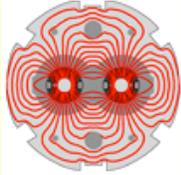


**LARP**

# LARP & PS2

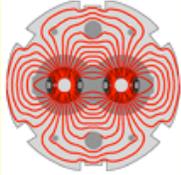
- The LARP AP branch is designed to give opportunities for LHC-related "interesting" accelerator R&D to US labs.
- The PS2 design study fulfills that criterion with challenging  $H^-$  injection, high circulating beam-current and beam-power handling needs and new rf cavity R&D needs
- The timing is right: PS 2 design is still in the ramp-up phase
- CERN has expressed interest in LARP getting involved



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## In the US-LARP Context...

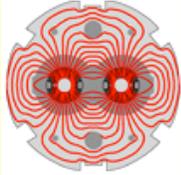
- The PS 2 design work has synergy with
  - Project X,
  - the beam collimation work ongoing at SLAC for LHC
  - e-Cloud studies going on at all LARP labs
  - beam-diagnostics work at BNL
- ...there will likely be more as we go along
- LARP evaluation of new initiatives FY09:
  - While the level of support LARP can provide is not yet definite and in most cases less than that requested by the proponents, the LARP ASAC has agreed to:....
    - Create a new “PS2 Studies” task under Accelerator Physics whose scope still needs more definition...



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# Areas for Collaboration

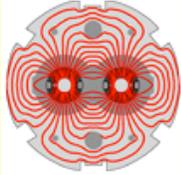
- **Simulations & tracking studies:**
  - H<sup>-</sup> injection, space-charge, halo development (FNAL, LBNL, BNL)
  - leading into beam-collimation studies (SLAC)
  - leading into exploring laser stripping injection (LBNL)
- **Collective effects:**
  - Impedance investigations (low & high frequencies, mostly the latter) (SLAC, FNAL)
  - e-cloud simulations, vacuum chamber treatments (all)
  - Multibunch instabilities, feedback systems (SLAC, LBNL)
- **Rf System design**
  - rf cavity design, e-m field calculations, llrf design & simulations (FNAL, SLAC)
- **Beam diagnostics**
  - Beam profile monitoring, tomographic phase-space reconstruction (for MTE)(BNL, SLAC)



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# PS 2 - FNAL MI Comparison

Parameter	Unit	FNAL MI	CERN PS 2	Comment
<b>Circumference</b>	m	3319	1346	scales almost exactly with E
<b>Top energy</b>	GeV	120	50	
<b>Inj energy</b>	GeV	8	4	
<b>Circulating beam</b>	A	2.5	3.9	FT beam for PS 2
<b>Ramp rate</b>	GeV/s	240	≈100	
<b>ppp</b>		1.70E+14	1.20E+14	FT beam for PS 2
<b>ppb</b>		3.10E+11	4.00E+11	LHC beam
			7.00E+11	FT beam
<b>rf freq injection</b>	MHz	52.8114	39.3491	
<b>frequency swing</b>	%	0.55	1.84	
<b>harmonic number</b>		588	180	
<b>emittance long</b>	eVs	0.5 (90%)	0.6 (99%)	LHC beam (FT is 0.35)
<b>momentum spread</b>		2.50E-03	2.00E-03	1E-03 @ PS 2 extraction
<b>bunch length</b>	ns	15 (inj)	4 (extr)	
<b>norm.emittance xverse</b>	μmr	25(2-sigma)	3 (rms)	Factor 6 difference due to lab. conventio



**LARP**

# Organization of this Session

- Report by Riccardo about the PS2 studies
- Indications of interest by each of the 4 LARP labs
  - BNL.....R. de Maria
  - FNAL.....E. Prebys
  - SLAC.....U. Wienands
  - LBNL.....M. Furman
- Tying it together...UW
- Note: Drafts of “Task Sheets” (7) are available at <http://www-project.slac.stanford.edu/ilc/larp/ps2/default.htm>
- We have a good amount of discussion time, so constructive questions, comments are welcome.