

Wed. May 8, 2019 at Fermilab (ICB, Hermitage Conference Room)

## ILC High Lumi and High Energy Workshop

### Preamble

Now that the Japanese decision on ILC has been delayed, the fate of ILC within the European community is likely to suffer, in particular since European enthusiasm for FCC-ee has been rising as the next Higgs Factory. Another competitor is CEPC. One of strong arguments that FCC proponents offer is the very high luminosity (6 times ILC) at 250 GeV. But the downside of FCC is of course the cost, which starts at 10B\$ (from CDR) not including the tunnel (+3 B\$) and detector (+2 B\$). Over a longer timescale, US will hold Snowmass to discuss future options for US HEP thrusts. There will probably be many proposals, such as Muon-collider-based Higgs Factory, Neutrino Factory, PIP-III, Gamma-Gamma Higgs Factory.

The goal of this one-day workshop is to discuss the possibility for a competitive ILC Higgs Factory with high luminosity upgrade option and the 350 GeV upgrade option. Can the High Lumi ILC offer the same luminosity as FCC-ee but be significantly less expensive than FCC-ee?

We will explore paths to competitive high luminosity upgrade options for ILC, estimate the cost for the upgrade, and discuss strategies on how to increase support for ILC within the European community and later at Snowmass. We will also discuss paths to a higher energy 350 GeV top factory upgrade to correspond to the higher energy option in the FCC plans.

### Agenda

8:30 – 8:45 Introduction to the Workshop: Sergey Belomestnykh and Anna Grassellino (Fermilab)

8:45 - 9:30 High Lumi Upgrade and 350 GeV parameter options and cost impacts: Hasan Padamsee (Cornell University)

*Present options for (6x) higher luminosity, with higher rep rates, higher number of bunches, longer RF pulse length. Discuss impact on cost and AC power, compare with FCC parameter list. Present paths for 350 GeV options.*

9:30 – 9:45 Discussion

9:45 – 10:15 High Q/High Gradient paths: Anna Grassellino (Fermilab)

*Increasing rep rate and increasing number of bunches by lengthening the RF pulse will impact the cost of the refrigerator. Higher Q's will be necessary. How high can the Q be made? For the 350 GeV energy upgrade higher gradients with higher Q will be necessary. What gradients may be possible for 350 GeV.*

10:15 – 10:30 Discussion

10:30 – 10:45 BREAK

10:45 – 11:15 Impact of 6x higher luminosity on the Detectors: Hitoshi Yamamoto (Tohoku University)

*Will we need brand new detectors, or will be able to modify the design of ILC detectors?*

11:15 – 11:30 Discussion

**11:30 – 1:00 pm LUNCH**

1:00 – 1:30 pm: Impact on Positron Source: Nikolay Solyak (Fermilab)

*What modifications of positron sources will be necessary to handle higher rep rates and higher number of bunches?*

1:30 – 1:45 pm Discussion

1:45 – 2:15pm Impact on Damping Rings and Ring-to-Main-Linac: Dave Rubin (Cornell University)

*What modifications of damping rings will be necessary to handle higher rep rates and higher number of bunches? Will RTML have to be modified?*

2:15 – 2:30 pm Discussion

**2:30 – 2:45 pm BREAK**

2:45 – 3:15 pm Open discussion on presented options, challenges and other topics

3:15 – 3:45 pm Interaction Region and IP parameters: Andrei Seryi (JLab)

*What are the implications for IR design and parameters? What design studies will be needed?*

3:45 – 4:15 pm Discussion

4:15 pm Closing Remarks: Sergey/Hasan/Anna