TTC 2019, TESLA Technology Collaboration

Tuesday 5 February 2019 - Friday 8 February 2019

AMS Student Nest, UBC Campus

Scientific Programme

Mission

The mission of the TESLA Technology Collaboration is to advance SRF technology R&D and related accelerator studies across the broad diversity of scientific applications, and to keep open and provide a bridge for communication and sharing of ideas, developments, and testing across associated projects. To this end the Collaboration supports and encourages free and open exchange of scientific and technical knowledge, expertise, engineering designs, and equipment. The TTC organizes regular collaboration meetings where new developments are reported, recent findings are discussed and technical issues are concluded.

Program

The program consists of plenary sessions giving a broader view of the main global issues plus parallel sessions organized around four working groups. WG1 and WG2 run in parallel for four sessions and then WG3 and WG4 run in parallel for an additional four sessions. The parallel sessions are summarized in a plenary session on Friday morning. There is also a hot topic session on Thursday and two special seminars on Friday morning.

Working Groups

The list of work packages chosen in the Scientific Program Committee includes:
WG1: Performance limitation in operational facilities – Multipacting, Field emission, RF stability
WG2: Cold test diagnostics and novel processing methods
WG3: Progress on the development in high Q and high gradient.
WG4: Cryomodule design – issues and solutions

WG1 Charge

WG-1: Performance limitation in operational facilities – Multipacting, Field emission, RF stability

The scope of this working group is to discuss the known performance limitations of operational facilities including both elliptical and non-elliptical variants – the operational experience can include longer term operation of test facilities. The range of discussion should include:

• Cavity Performance experience – safe limits

• Multipacting issues – limitations and mitigations

• Field emission

• Trapped flux - considering local sources (active magnets) and cooldown dynamics

• voltage and phase stability – microphonics, LFD, Vector sum (pulsed and cw)

• 4K vs 2K operation

WG2 Charge

WG-2: Cold test diagnostics and novel processing methods
This working group is asked to consider two main topics. The first topic is to discuss the various cold test diagnostics both installed in vertical and horizontal test facilities but also in working cryomodules. A second topic is to discuss new ideas in the field of cavity processing. The range of discussion should include:
• Topic #1
o Magnetic field measurement and mapping
o Temperature measurement and mapping
o 2nd sound quench identification
o Field emission radiation monitors
o Coupler protection
o In module diagnostics
• Topic #2
o Green surface polishing
o Vertical EP
o Plasma processing (TEM mode cavities, CMs)
o Use of robotic engineering and assembly

WG3 Charge

WG-3: Progress on the development in high Q and high gradient.
Bulk Niobium is at present the most common material for superconducting RF cavities in accelerator applications. Over the last several years new heat treatments including doping have been used to reach unprecedented performance of Niobium cavities in terms of High Q and/or High Gradient. Most of the work has concentrated on cavities operating at 1.3GHz driven by cw applications like LCLS-II and future pulsed operation like the ILC. The scope of this working group is to discuss the most recent results with respect to pushing niobium towards Higher Q and Higher Gradient.
Discussions should include:
• Progress on technical performance of various heat treatments with and without doping to deliver high Q and/or high gradient performance
• Progress on understanding the underlying mechanisms at work in the various treatments including sample analysis and theory
• New results at other cavity frequencies that could shed light on the core understanding

WG4 Charge

WG-4: Cryomodule designs – issues and solutions
Many challenging projects are on the go or planned requiring both elliptical and non-elliptical cavity technology. To face the requirements of each application several different cryomodule approaches have been developed or are being proposed. They include long TESLA style pipe, top-loading box, pipe with strongback, pipe with space frame, bottom up box, side load box. The aim of this working group is to address the issues and difficulties for the various cryomodule designs. Topics for consideration are:
• Assembly

• Alignment
• Cw vs pulsed operation
• microphonics
• module transport
• production and operational costs
• cryogenic design

Hot Topic Charge

Hot Topic – How do we safely transport cryomodules around the world?
Modern projects are relying more and more on having cryomodules assembled in one facility and having them shipped either across the country or even between continents to the final accelerator installation. The recent negative experience in transporting a LCLS-II cryomodule from FNAL to SLAC has raised cryomodule transportation as a major concern for LCLS-II but also for other projects that need to consider inter-facility transport. The mandate of the Hot Topic is to open a discussion on the topic of cryomodule transport considering the following topics:
• Community experience to date
• Lessons learned from LCLS-II
• Cryomodule design considerations
• Shipping container design and considerations
• Means of shipping – land, air, sea