



IF03: Solid State Detectors and Tracking Status and Plans

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Where are we?

- The current stage of the Snowmass Process is the generation of White (Contributed) Papers.
 - Topical Group Summaries, Instrumentation Summaries to follow
- Today's meeting will focus on White Paper progress and planning
 - Provide outline with responsible persons per section
- Next meeting Thursday at 1 pm Central on Jan 20th
 - Expect to have the first draft white paper
- Instrumentation Frontier White Paper Wrap-up
 - February 14-17 @ Stonybrook University: in-person is default plan
 - 2 days parallel sessions (IF TGs): sit down and start finishing white papers (1 month before deadline)

White Paper Timelines

11/21

12/21

1/22

2/22

3/23

★ 11/19 IF White Paper Wrap- Finalize list of WPs

★ 12/16 IF03 Meeting – Outline with author responsibilities

★ 1/20 IF03 Meeting – First Drafts

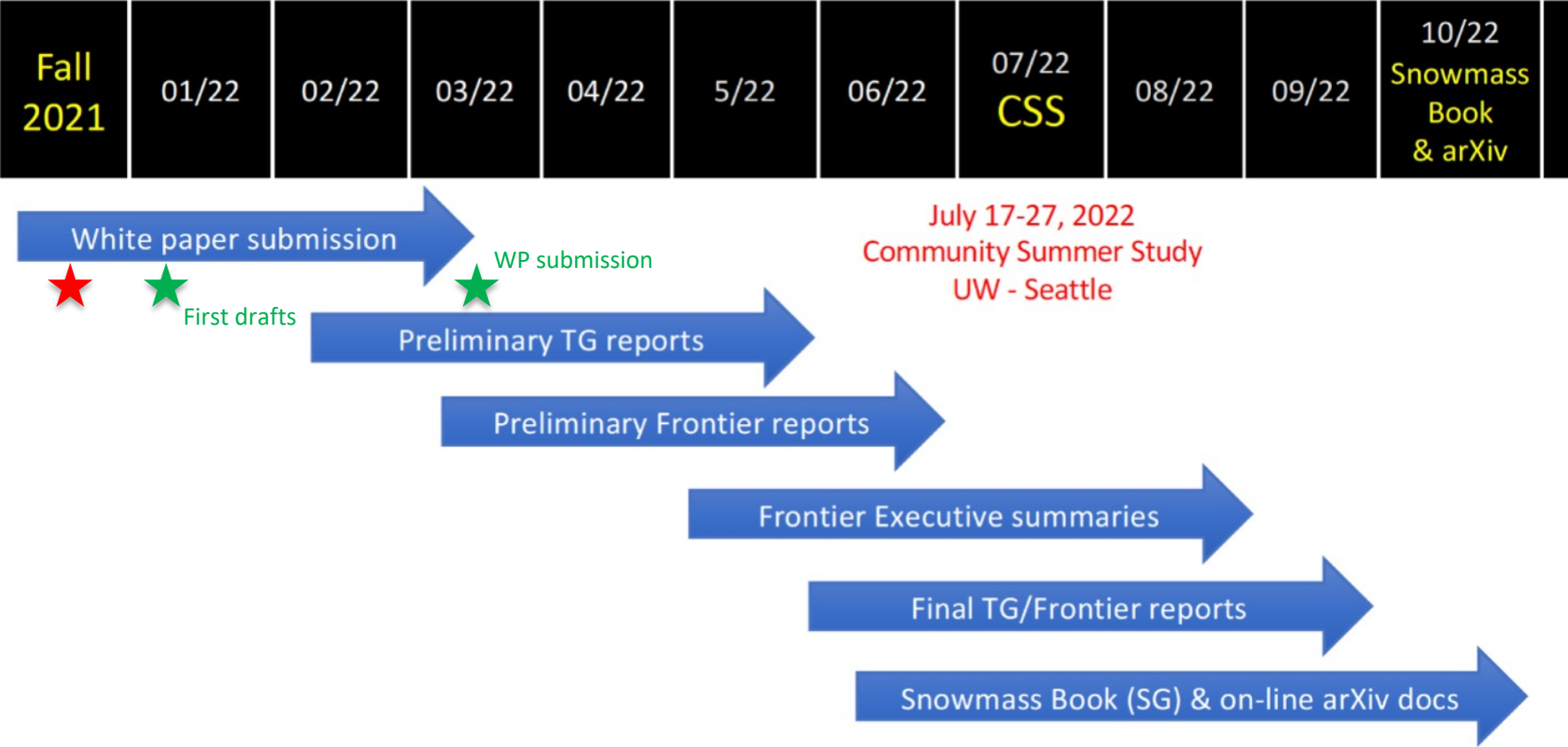
2/14-17 IF/CPAD Meeting – Finalizing Drafts (in person)



3/15- White Paper Deadline to be including in WG reports



Snowmass Timelines



Snowmass Important Dates

- White Paper submission to arXiv: no later than March 15, 2022. Late submissions and updates are likely not to be incorporated in the working group reports, but will be included in the Snowmass on-line archive documents.
- Preliminary reports by the Topical Groups due: no later than May 31, 2022.
- Preliminary reports by the Frontiers due: no later than June 30, 2022.
- Snowmass Community Summer Study (CSS): July, 2022 at UW-Seattle.
- All final reports by TGs and Frontiers due: no later than September 30, 2022.
- Snowmass Book and the on-line archive documents due: October 31, 2022.

White Paper Content, Templates, Topic Summaries

- White papers should address
 - Challenges that are being tackled
 - Briefly summarize the physics motivation,
 - Recent results and a roadmap for near- to middle-term R&D.
- Suggested length of 10-15 pages
 - One page executive summary
 - Executive summaries will be used to build up Topical Group Summary
- Topical Group Summary should give a general overview of the area of silicon trackers, in addition to specific summaries of each WP
 - Suggested length of 5-10 pages, with 1-2 page executive summary
- LaTeX template at <https://snowmass21.org/submissions/start>

White papers in IF03

- 4D trackers and precision timing: **R. Heller, A. Schwartzman**
- Integration and Packaging: **S. Mazza**
- Novel Sensors for Particle Tracking: **S. Seidel**
- Mechanics, lightweight materials, cooling: **A. Jung**
- Simulation tools: **B. Nachman**
- Monolithic integrated silicon detectors, CMOS (MAPs): **C. Vernieri**
- Non-silicon trackers:

Backup

White papers (1)

1. Physics motivations for requirements of tracking detectors (Requirements)

- IF9_IF3-EF9_EF0-AF4_AF1-143: **Muon collider tracker requirements**: contact S. Jindariani (FNAL)
 - EF1_EF2-IF3_IF0_Valentina_Maria_Martina_Cairo-047: **Strange Quark as a probe for new physics in the Higgs Sector**: contact V.M.M. Cairo (SLAC)
 - EF3_EF0-RF1_RF0-IF3_IF6-077: **Searching for $B_s \rightarrow \text{PhiNuNu}$ and other $b \rightarrow s\text{NuNu}$ processes at CEPC**: contact M. Ruan (IHEP China)
 - EF4_EF0-AF3_AF0-IF3_IF5_GrahamWilson-119: **Exploring precision electroweak physics measurement potential of e^+e^- colliders**: contact G. Wilson (KU)
 - EF5_EF7-TF7_TF0-IF6_IF3-CompF3_CompF0_Ben_Nachman_(bpnachman@lbl.gov)-035: **Jets and jet substructure at future colliders**: contact B. Nachman (LBNL)
 - RF-EF-OF-CompF-011: **Letter of interest from the US LHCb Group**: contact M. Artuso (Syracuse0)
 - **Solid State & Tracking in BRN**- Marina Artuso (Syracuse)-IF03 Presentation
 - **Silicon detectors R&D and physics drivers for future machines**- Caterina Vernieri- IF03 Presentation
 - **Parameters for future trackers**- Simone Griso (LBNL)-IF03 Presentation
 - **EF perspective (Maxim Titov) and RF perspective (Mariana Artuso (Syracuse))**-CPM 130
- Will be organized by EF and RF liaisons to IF (Maxim, Caterina, Marina)
 - Designed to give requirements/motivation for the rest of the White Papers

White papers (2)

2. 4D trackers, precision time + position; OR precision position + moderately good time (Timing)

- IF3_IF0_University_of_California_Santa_Cruz-018: **Use of extremely thin ‘LGAD’ ultra-fast silicon detectors for fast timing and tracking in high radiation sections at future colliders**: contact: S. Mazza (UCSC)
- IF3_IF7_Karri_DiPetrillo-142: **Precision timing detectors for future colliders**: contact K. DiPetrillo
- IF3_IF7-131: **4-dimensional trackers**: contact A. Schwartzman (SLAC)

3. Monolithic integrated silicon detectors, CMOS (MAPs)

- IF3_IF2_Jessica_Metcalf-154: **Silicon Pixel Detectors in Space**; contact. J. Metcalfe (ANL)
- IF3_IF7_Martin_Breidenbach-113: **Large area CMOS monolithic active pixel sensors for future colliders**: contact M. Breitenbach (SLAC)
- IF7_IF3_Leo_Greiner-160: **Monolithic active pixel sensors for high performance tracking**: contact L. Greiner (LBNL)

4. Integration and Packaging (Integration)

- IF3_IF5_Simone_Mazza-175: **High density 3D integration of LGAD sensors through wafer-to-wafer bonding**: contact S. Mazza (UCSC)
- IF3_IF0_Ronald_Lipton-080: **3D Integration of Sensors and Electronics**: contact R. Lipton (FNAL)
- **2.5/3D integration**- Robert Patti (NHanced Semiconductor INC)-IF03 presentation

White papers (3)

5. Mechanics, lightweight materials, cooling (Mechanics)

- IF3_IF0_Jung-118: **Light-weight and highly thermally conductive support structures for future tracking detectors**: contact: A. Jung (Purdue)
- **Mechanics supports for future tracking detector**-Eric Anderssen (LBNL)-IF03 presentation
- **Future cooling - Yadira Padilla- upcoming IF03 meeting No longer involved. IS THERE ANYONE THAT COULD PROVIDE INPUTS HERE?**

6. Novel Sensors for Particle Trackers (Novel)

- IF3_IF0_N_Fourches-107: **Beyond CMOS sensors, submicron pixels for the vertex detector** : contact: N.T. Fourches (CEA-Saclay)
- IF3_IF9_Jessica_Metcalf-161: **Thin Film Detectors**: contact Jessica Metcalfe (ANL)
- IF3_IF0_H_Kagan-130: **3D Diamond Detectors**: contact: H. Kagan (OSU)
- **Silicon Sensors in 3D Technology**: contract S. Seidel (New Mexico)

7. Non-silicon trackers: (Non-silicon)

- IF3_IF2_Mazziotta-100: **Gamma-ray Scintillator Fiber Tracker**: contact M. Nicola Mazziotta (INFN Bari)
- IF0_IF0-RF0_RF0_Daniel_Ambrose-094: **Mu2e-II Tracker**: contact D. Ambrose (Minnesota)
- IF0_IF0-043: **Identification of TeV hadrons: Transition Radiation Detectors**: contact M. Albrow (FNAL)
- IF3_IF0_Pavel_Murat_129: **Exploration of charge particle tracking using InAs quantum dots in GaAs semiconductor matrix**. Contact M. Hedges (Purdue)

8. Simulation Tools for Silicon Detector Developments (Simulation)

- **Simulation tools and radiation damage** - Ben Nachman (LBNL)-IF 03 presentation
- **Simulation tools and radiation damage** - Timo Peltola (Texas Tech)- IF03 presentation

Completeness and contacts

- Is the White Paper list capturing the community completely?
 - Is your Lol incorporated in one of the papers?
- Is there any optimization to be done with the groupings?
 - Should we split any?
- For each White Paper, we would like a contact person to simplify communication
 - Can each White Paper please volunteer 1-2 persons?