

# Farewell – TIPP2021 and Detector R&D Roadmaps

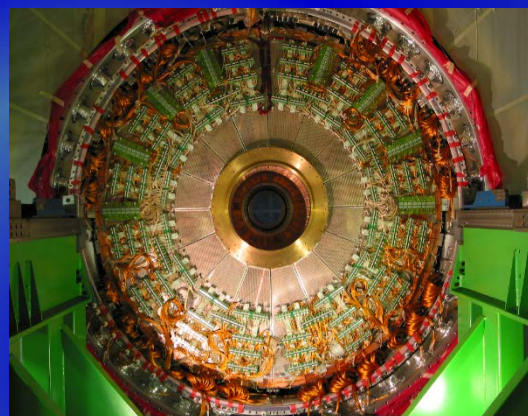
Maxim Titov, CEA Saclay, Irfu, France

(on behalf of the TIPP2021 Organizers & TIPP Steering Committee)

International Conference  
on Technology and  
Instrumentation  
in Particle Physics

May 24-28, 2021

Online format



*TIPP2021 Group Photo – Fri., May 28, 2021 in Gather.Town – Poster Session Room*





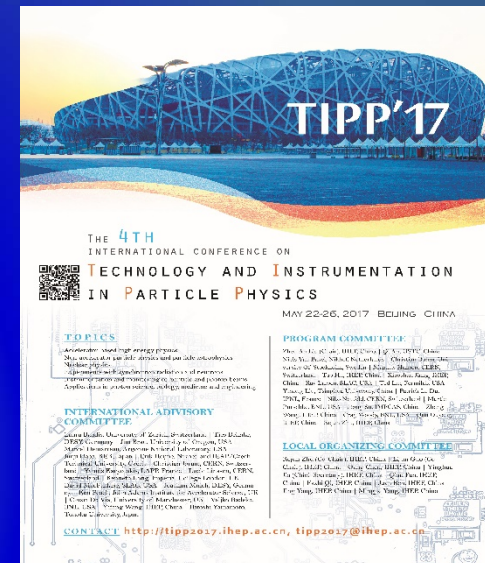
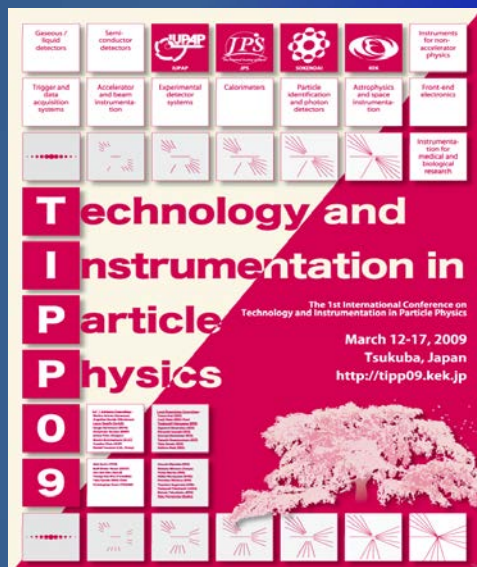
# TIPP Conferences – Endorsed & Supported by



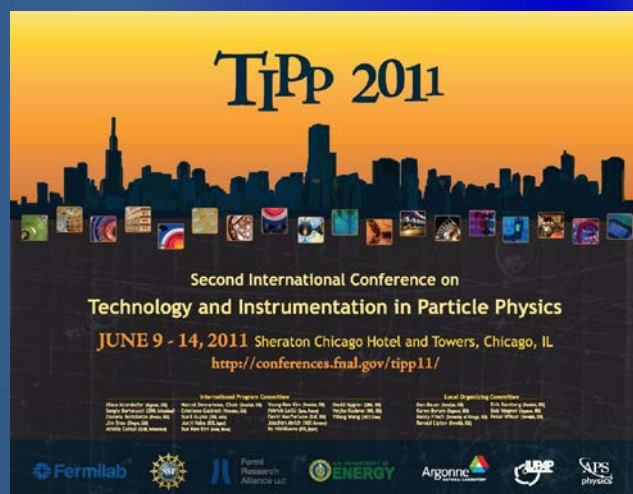
**TIPP2009 Tsukuba, Japan**  
(<https://tipp09.kek.jp>)

**TIPP2014 Amsterdam, NL**  
(<http://www.tipp2014.nl/>)

**TIPP2017 Beijing, China**  
(<http://tipp2017.ihep.ac.cn/index.html>)



**TIPP2011 Chicago, USA**  
(<https://conferences.fnal.gov/tipp11/>)



# TIPP 2021

International Conference on Technology and Instrumentation in Particle Physics



**TIPP2020**  
(TRIUMF / Canada)



**TIPP2021**  
(Hosted by TRIMPF, Online format)

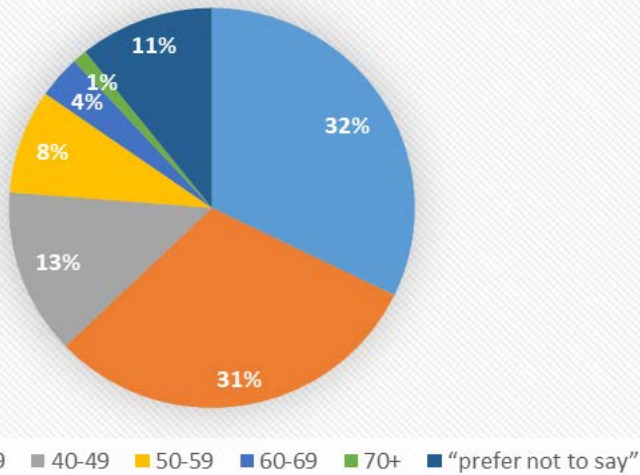
<https://tipp2021.triumf.ca/>

# TIPP2021 Conference Statistics

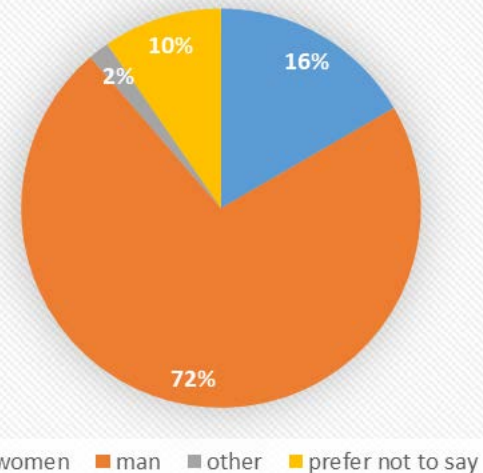
I. Trigger  
F. Retiere

- ✓ TIPP 2021 conference attendance: 529 registrants (167 students)
- ✓ Previous conferences: Tsukuba(440), Chicago (483), Amsterdam(448), Beijing (301)

TIPP2021: Age distribution of participants



TIPP 2021: Gender Statistics



TIPP2021 Participants:  
Geographic distribution



- ✓ **TIPP 2021 was very successful – the largest conference (online format)**
- ✓ Plenary session on Monday:  
424 logins over 285 minutes, but peak attendance 160 – 170 participants
- ✓ Parallel sessions: typically, between 20 - 45 participants for most of them
- ✓ Poster session: over 70 people in Gather.Town for several sessions
- ✓ Organizers work hard on diversity:
  - Plenary speakers: 8 (female); 15 (male)
  - LOC is more than 50% female



# TIPP2021: Diverse Plenary Session Program (I)

## Current / Future Facilities:

(VEPP, KEKb/Belle, SCTF, CepC, ILC/CLIC, EiC, ALPHA-g, rare event searches,...)

### Low Energy e+e- Colliders

Ivan Koop, BINP, 630090 Novosibirsk, Russia

International Conference  
on Technology and Instrumentation  
in Particle Physics, TIPP 2021

May 24-29, 2021, online format, Triumf, Canada

### Status and Perspectives of the ILC and CLIC Studies

Benno List  
DESY

TIPP 2021  
May 24-29, 2021

### Detector Challenges from HL-LHC to FCC-hh

TIPP 2021, May 24<sup>th</sup> 2021

W. Riegler, CERN

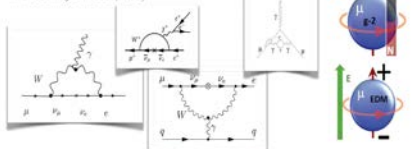
<https://lhc-cck.web.cern.ch>

EPJ ST 228, 4 (2019) 755-1107

<https://link.springer.com/article/10.1140/epist/e/2019/100087>

Rare process searches (at PSI, JPARC, Fermilab)  
Focus on muon based experiment detectors

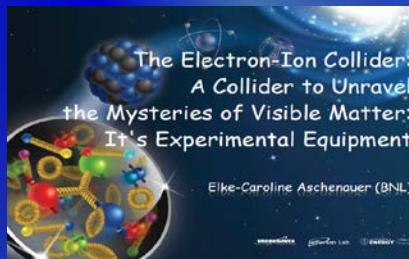
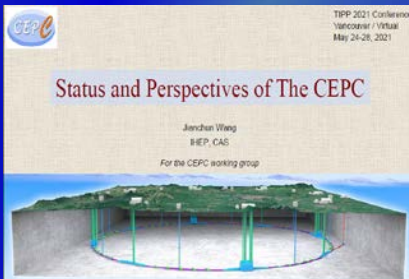
Angela Papa  
Paul Scherrer Institute (Switzerland) and University of Pisa (INFN)  
TIPP2021 May 24th-28th (virtual)



KEK

### Performance and Running Experience of the Belle II Silicon Vertex Detector

Katsuro Nakamura (KEK)  
on behalf of the Belle II SVD collaboration  
May 28, 2021 TIPP2021



I. Trigger  
F. Retiere

**CAPP**  
Center for  
Axion and Precision  
Physics Research

**New technology and breakthroughs  
in axion dark matter search**

Yannis K. Semertzidis, IBS-CAPP & KAIST  
TIPP meeting (online), TRIUMF May 24-29, 2021

- CAPP is ready to take data with DFSZ sensitivity level in the 1-8 GHz frequency range
- This and other frequencies are also targeted for high sensitivity searches by CAPP, ADMX, HAYSTAC, MADMAX, IAXO, ARIADNE, Hadronic EDMs, DM-RADIO, CASPEr, etc.

### Skipper-CCDs and the SENSEI Search for Sub-GeV Dark Matter

Sho Uemura

Iel Aviv University  
for the SENSEI Collaboration

SU was supported in part by the Zuckerman STEM Leadership Program

### Neutrino Technologies TIPP 2021



Kate Scholberg (Duke University)  
May 24.

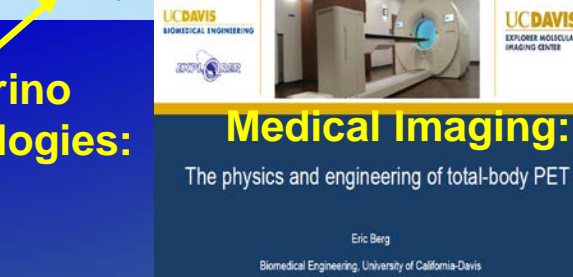
Neutrino  
Technologies:

### Medical Imaging:

The physics and engineering of total-body PET

Eric Berg

Biomedical Engineering, University of California-Davis



**UNIVERSITY OF ALBERTA**

May 24<sup>th</sup> 2021  
TIPP 2021, Virtual

**Highlights of  
Dark Matter Detector  
Technologies**

Arthur B. McDonald Marie-Cécile Piro INNOVATION.CA

Quantum enhanced methods for ultralight dark matter searches

TIPP talk May 28<sup>th</sup> 2021  
Konrad W. Lehnert

Haystack

U.S. DEPARTMENT OF ENERGY Fermilab NSI

Office of Science DOE-HEP QuantISED program JILA

**Launch and first results of Mini-EUSO telescope:  
observing UV emissions of cosmic and terrestrial origin  
from the International Space Station**

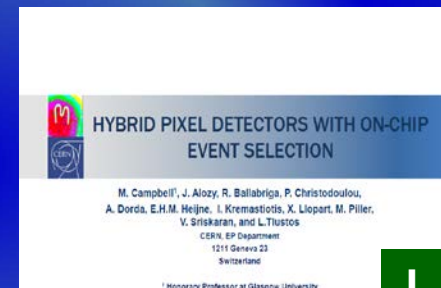
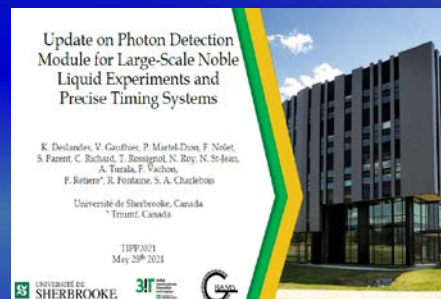
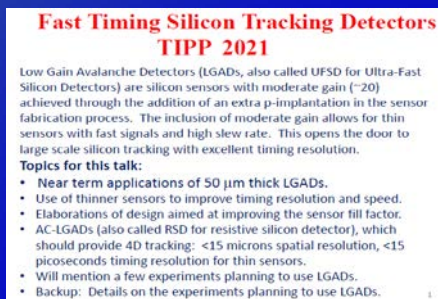
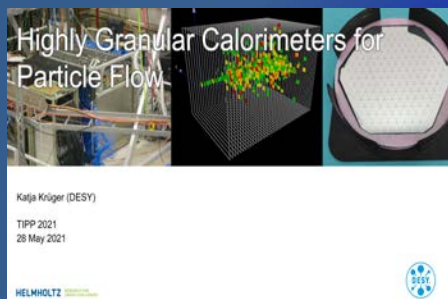
L. Marcelli  
(INFN, Section of Roma Tor Vergata, Italy)  
on behalf of the JEM-EUSO collaboration

Space  
Instrum.:

# TIPP2021: Diverse Plenary / Parallel Sessions Program (II)

## Enabling Technologies:

(CALICE / Pflow, RD51 / MPGD, Fast Timing, Digital SiPMs, Track-trigger, Electronics/DAQ, ...)



I. Trigger  
F. Retiere

## Parallel and Poster Sessions Program:

Submitted > 400 abstracts; arranged as ~ 200 oral talks in 4-5 sessions in parallel (Tue-Thu) and ~ 200 posters

- Readout and Data Processing: FEE, Trigger and DAQ, Data Transfer Links and Networks;
- Experiments: Trackers, Calorimeters, High energy physics, Neutrino, Dark Matter Detectors, Space and particle astrophysics, Precision techniques at low energy
- Sensors: Light-based detectors, Photo-detectors, Emerging Technology, Solid-state position sensors Solid-state calorimeters, Noble liquid detectors, Gaseous Detectors
- Technology Transfer

**TIPP2021 proceedings will be published in the open access Journal of Physics: Conference Series → deadline June 25, 2021: <https://tipp2021.iopconferenceseries.rivervalley.io/>**



# ECFA Detector R&D Roadmap

ECFA

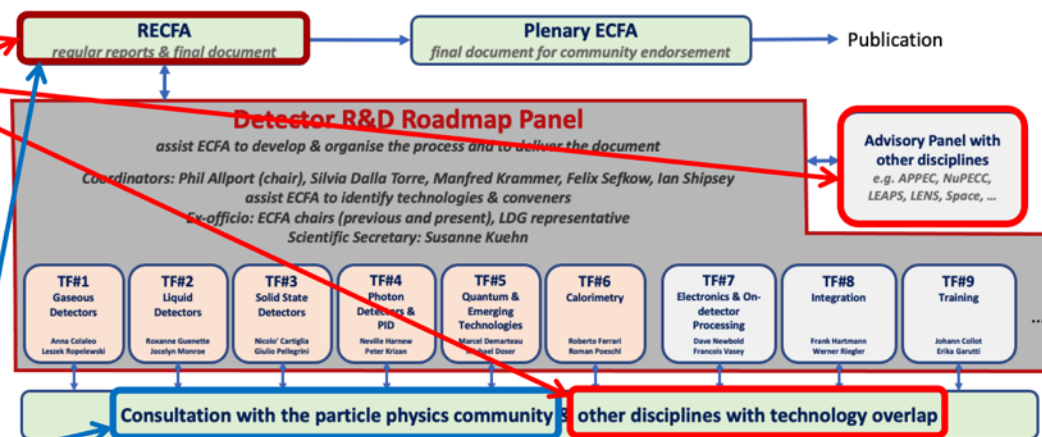
European Committee for Future Accelerators

- ✓ Focus on the technical aspects of detector R&D requirements given the 2020 EPPSU deliberation document listed “*High-priority future initiatives*” and “*Other essential scientific activities for particle physics*” as input and organise material by Task Force.
- ✓ Task Forces start from the future science programmes to identify main detector technology challenges to be met (both mandatory and highly desirable to optimise physics returns) to estimate the period over which the required detector R&D programmes may be expected to extend.
- ✓ Within each Task Force create a time-ordered technology requirements driven R&D roadmap in terms of capabilities not currently achievable.

The roadmap should identify and describe **diversified detector R&D portfolio** that has the largest potential to **enhance the performance of the particle physics programme** in the **near and long term.**”

**Organised by ECFA, a roadmap should be developed by the community to balance the detector R&D efforts in Europe, taking into account progress with emerging technologies in adjacent fields**

**The community should define a global detector R&D roadmap that should be used to support proposals at the European and national levels**



**P. Allport**

<https://indico.cern.ch/e/ECFADetectorRDRoadmap>

<https://indico.cern.ch/event/957057/page/21633-mandate> (Panel Mandate document)

<https://arxiv.org/abs/1910.11775> (EPPSU Briefing Book)

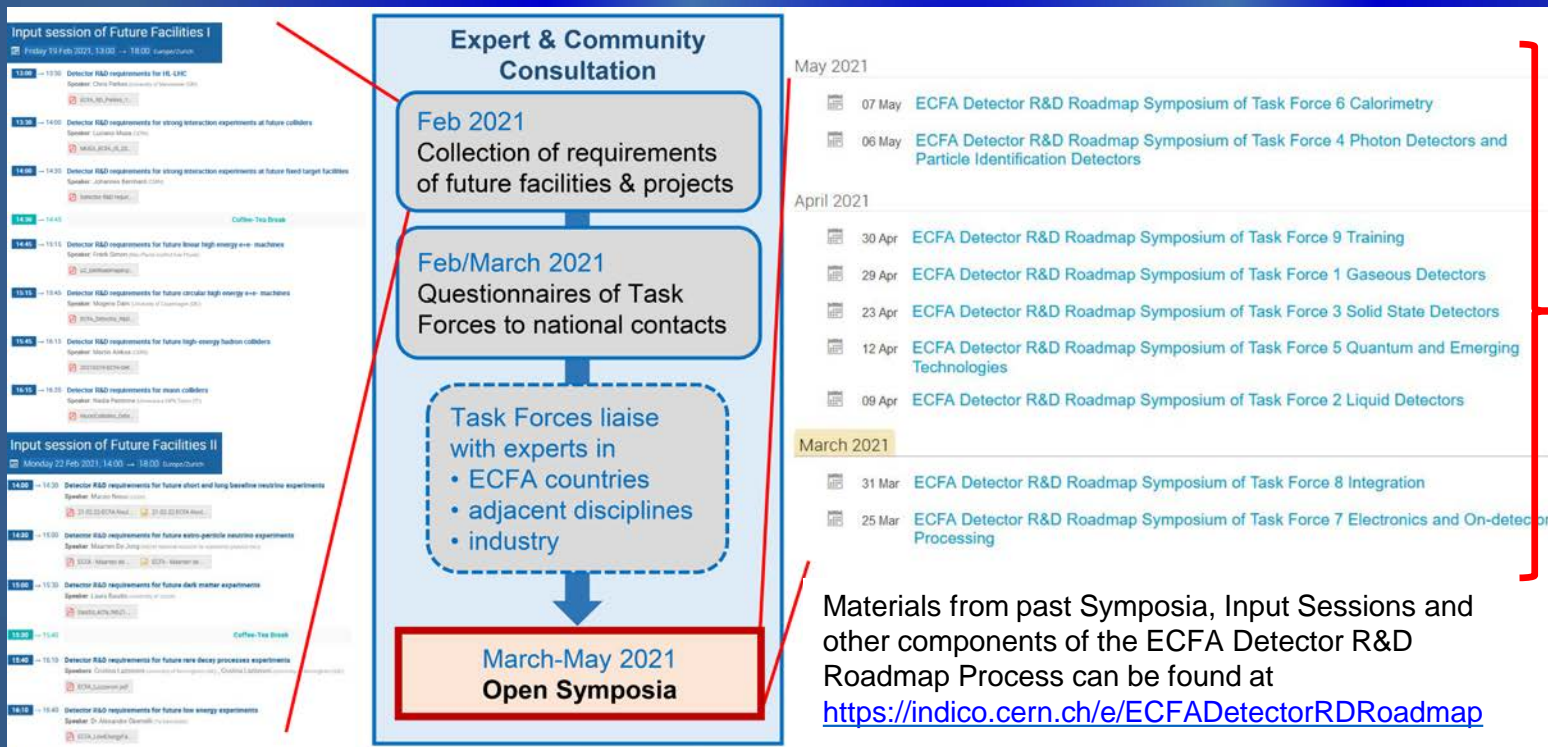
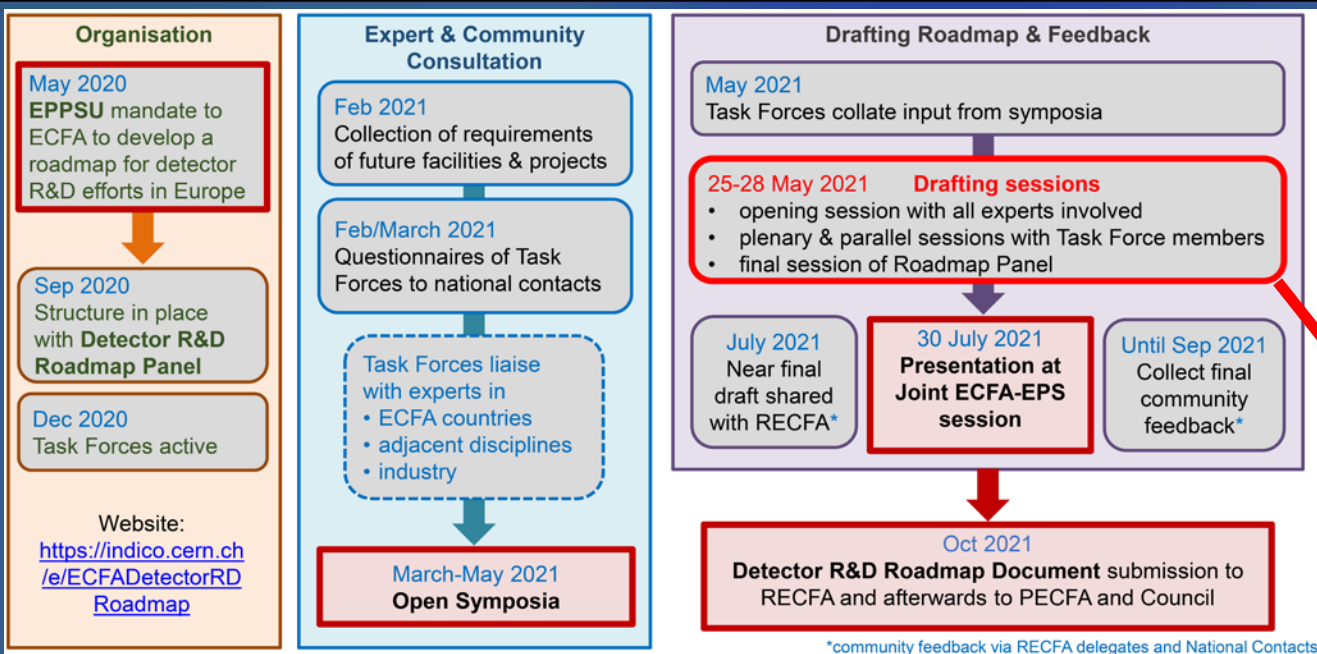
<https://ep-dep.web.cern.ch/rd-experimental-technologies> (CERN EP R&D)

[https://ecfa-dp.desy.de/public\\_documents/](https://ecfa-dp.desy.de/public_documents/) (Some useful documents from the ECFA Detector Panel)

**Useful links for Roadmap Process:**

# ECFA Detector R&D Process and Timeline:

May 25-28, 2021:  
Drafting session (public part):  
<https://indico.cern.ch/event/1037113/>



Common registration for the symposia had logged 1359 participants by the end of the last one.

P. Allport

# From the 2020 EPSSU to the 2020-2022 Snowmass Process

The Snowmass Process is organized by the DPF of the American Physical Society: <https://snowmass21.org>

- Identify and document a vision for the future of particle physics (PP) in the US in a global context
- Communicate opportunities for discovery in PP to broader community and to the (US) government.

## Major Snowmass Events in 2020 (selected links):

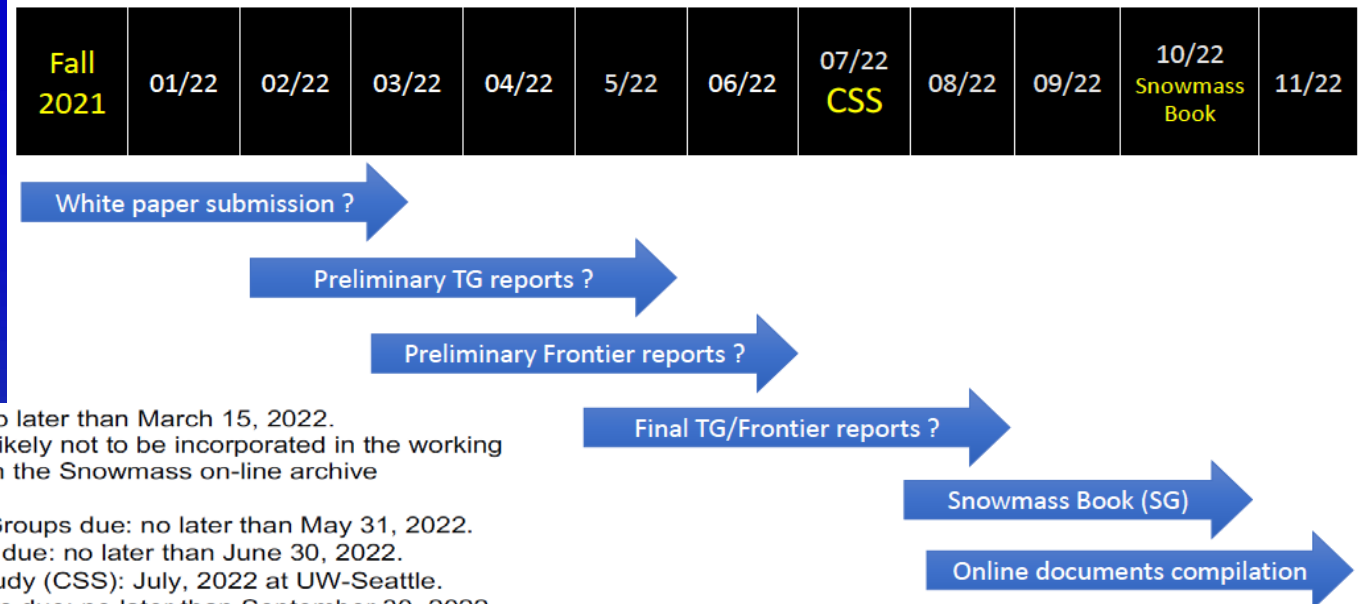
- ✓ Kick-off April APS meeting, Apr. 18, 2020: <https://indico.fnal.gov/event/23601>
- ✓ Instrumentation Frontier Workshop, Jun. 19, 2020: <https://indico.fnal.gov/event/43730>
- ✓ Submission of a 2-page Letter of Interest: <https://snowmass21.org/loi> ; deadline - August 31, 2020
- ✓ Community Planning Meeting, Oct. 5-9, 2020: <https://indico.fnal.gov/event/44870>

*Because of the COVID-19 pandemic, the Snowmass Report and Community Summer Study meeting (CSS) has been delayed by one year until 2022*

→ *Major Snowmass activities are on-hold from Feb. to Jul. 2021*

- 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.

## Tentative timeline



Tao Han @ All Conveners/Advisors Meeting

6

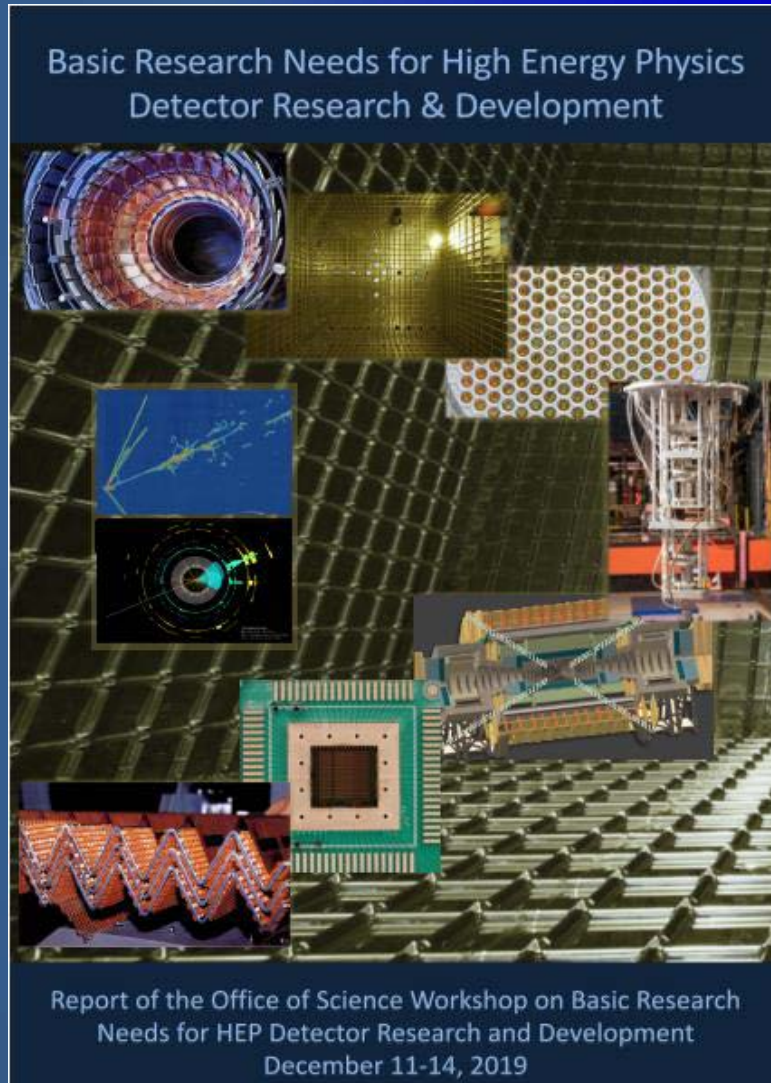
**US P5 Strategy Process starts by end of 2022; P5 final report – late 2023 / early 2024**



# US: Basic Research Needs Report & Snowmass Process

## DOE-BRN Report published (Sep. 2020)

<https://science.osti.gov/hep/Community-Resources/Reports>



## Snowmass Instrumentation Frontier:

<https://snowmass21.org/instrumentation/start>

Conveners: P. Barbeau, P. Merkel, J. Zhang

- **Snowmass Summary for Public**
    - 2 pages
  - **Snowmass Summary Report**
    - ~50 pages
  - **Snowmass Book**
    - ~500 pages
  - **Topical Group Reports**
  - **Reports of Multi-Frontier Topics**
  - **Contributed Papers**  
= **White Papers**
- Executive Summary: ~10 pages
  - Introduction
  - 10 Frontier Executive Summaries
  - Executive Summaries of Multi-Frontier Topics
  - Conclusion
  - Snowmass Summary Report (~50 pages)
  - Frontier Summaries (~400 pages with 10 Frontiers)
  - Multi-Frontier Topic Summaries (~50 pages)
  - Topical Group Reports: short reports
  - Multi-Frontier Topics spanning multiple Frontiers.
  - Each Multi-Frontier Topic Summary: ~10 page
  - References

**Snowmass Report**  
**« Community-Driven »:**

**IF Frontier  
Summary:  
40 pages**

(Written by TG members  
including early careers)

(Written by the  
community including early  
careers)

## CPAD Instrumentation Workshop (Mar. 18-22, 2021):

<https://www.stonybrook.edu/cfns/cpad2021/index.html>



P. Merkel

# ICFA Instrumentation Awards



(by ICFA Instrumentation, Innovation and Development Panel)

## Proposal to Establish the ICFA Instrumentation Awards

The ICFA IID Instrumentation Taskforce: Marcel Demarteau (ORNL), Kazunori Hanagaki (KEK), Petra Merkel (Fermilab), Fabrice Retière (TRIUMF), Ian Shipsey (Oxford)

<https://icfa-iid.physics.ox.ac.uk/#prizes>

On behalf of the ICFA IID Panel: Didier Contardo (Lyon), Bonnie Fleming (Yale), Marcel Demarteau (ORNL), Francesco Forti (Pisa), Gerardo Herrero Corral (CINVESTAV), Kazunori Hanagaki (KEK), Peter Krizan (Ljubljana/JSI), Gobinda Majumder (Tata, Mumbai), Petra Merkel (Fermilab), Eugenio Nappi (Bari), Inkyu Park (Seoul), Fabrice Retière (TRIUMF), Felix Sefkow (DESY), Ian Shipsey (Oxford), Yuriy Tikhonov (Budker, Novosibirsk), Hongbo Zhu (IHEP).

### • Process

- Nomination by September 2021
- Review by committee
  - Completed in December 2021
- Announcement January 2022
- Award ceremony at the Vienna or Pisa advanced detector conferences in 2022

### • Yearly Award

(nomination valid for 3 years)

- **The transformer:** a junior individual whose contribution to instrumentation is promising major advance
- **The enabler:** and individual or team whose contribution to instrumentation is enabling major advances
- **The Game changer:** a team having developed a game-changing technology for particle physics



# TIPP Series: Science-Driven Cross-Disciplinary Conference

- ✓ Established in 2009 by C11/IUPAP, originally conceived as the “Rochester conference in Instrumentation” → alternate with VIENNA, ELBA conference series; same year as INSTR
- ✓ Remarkable progress achieved during the last decade, still recognition of the conference is not yet at the level of ICHEP or Lepton-Photon in particle physics community  
→ address how is the conference different from IEEE, industry participation, etc ...
- ✓ The TIPP Steering Committee has been established in 2020 with a formal mandate from C11/IUPAP to set up a long-term leadership ensuring strategic view, continuity and tradition

TIPP Steering Committee	Membership (2021 - 2023)
Niels van Bakel	Nikhef, Amsterdam, NL
Ties Behnke	DESY Hamburg, Germany
Marcel Demarteau	ORNL, USA
Francesco Forti	INFN / University Pisa, Italy
Kazunori Hanagaki	KEK, Japan
Manfred Krammer	CERN, Switzerland
Petra Merkel	Fermilab, USA
Fabrice Retiere	TRIUMF, Canada
Yuri Tikhonov	BINP Novosibirsk, Russia
Maxim Titov	CEA Saclay, France
Yifang Wang	IHEP, Beijing, China

C11/IUPAP and  
TIPP SC Joint Meeting  
on May 25, 2021:

- ✓ 4 proposals for TIPP 2023 conference site has been reviewed → final decision based on C11 vote
- ✓ Preliminary discussion of TIPP SC functions, rotation of members, bylaws

If you have any inputs or suggestions, please contact: [tipp-steer@desy.de](mailto:tipp-steer@desy.de)

# TIPP 2021 Local Organizing Committee

Thanks for a **wonderful** and  
stimulating **conference** and **thank**  
**you** for your generosity  
in **organizing the conference**.



D. Giasson  
(TRIUMF)  
Website



J. Thomson (TRIUMF)  
Conference org./  
proceedings



F. Retière  
(TRIUMF)



I. Trigger  
(TRIUMF)



PA. Amaudruz  
(TRIUMF)



F. Corriveau  
(McGill/IPP)



C. David  
(York)



C. Hoehr  
(TRIUMF)



N. Ilic  
(Toronto/IPP)



A. Konaka  
(TRIUMF)



L. Kurchaninov  
(TRIUMF)



J. Mammei  
(Manitoba)



N. Park  
(Queen's)



L. Poley  
(SFU/TRIUMF)



JF Pratte  
(Sherbrooke)



S. Scorza  
(SNOLAB)



B. Stelzer  
(SFU)



S. Viel  
(Carleton)