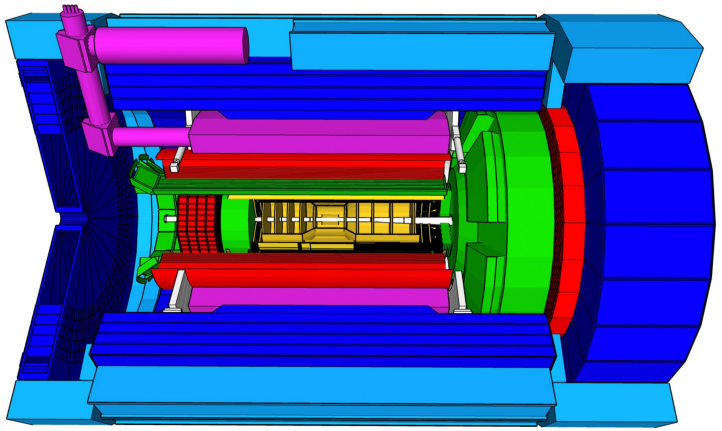


DocID	Rev.	Validità
INFN-CSN3-QA-EPIC-100.OO	1.0	Final

Data 7/06/2024

Letter of Intent
Richiesta di passaggio a sigla di esperimento ePIC
da parte della sigla di networking EIC_NET

ePIC Italia and status of the EIC project

P. Antonioli (INFN Bologna)

"provide status and useful references"

VI Giornate Nazionali EIC- I Meeting ePIC Italia
27-28/7/2024

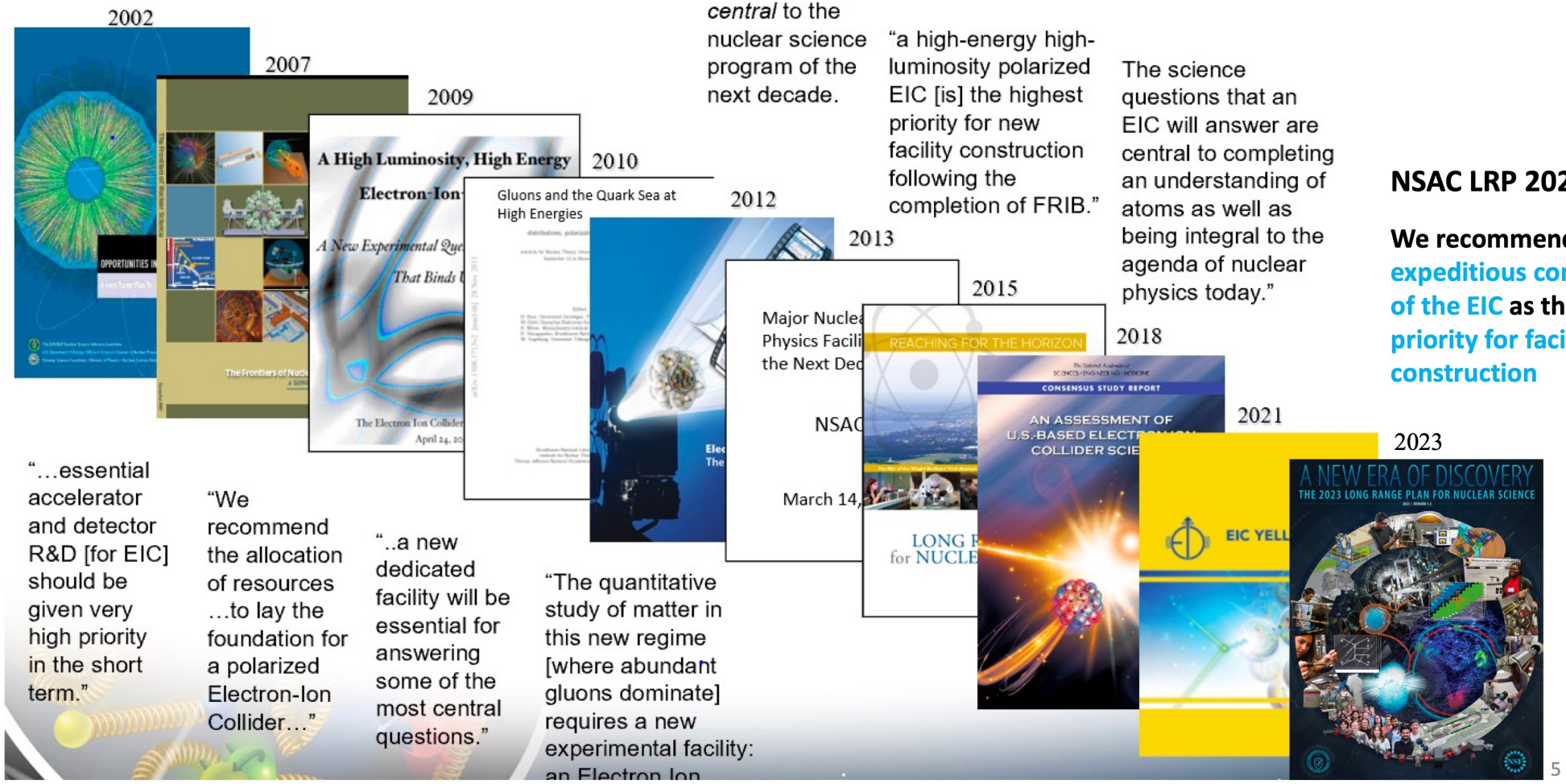
This talk is not about our letter of intent

ePIC - Letter Of Intent
Presentation to CSN3 // INFN Nuclear Physics Committee
Presentations to CSN3 EIC_NET referees

Table of Contents

What is **not** in the **in-kind** contribution

> 20 years long pathway!



NSAC LRP 2023:

We recommend the expeditious completion of the EIC as the highest priority for facility construction

Credits: This slide from S. Fazio. talk at "Second workshop on advancing the understanding of non-perturbative QCD using energy flow" , 6-9 Nov 2023 - SBU

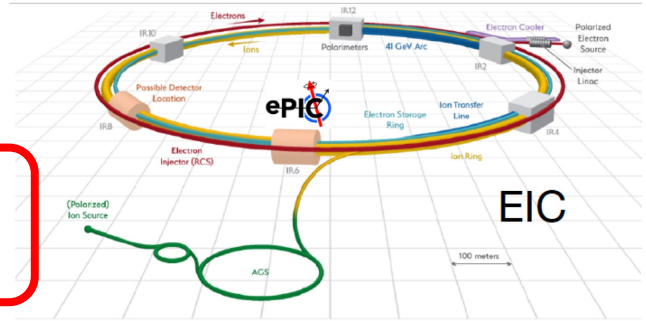
The only new accelerator in the next decade

NuPECC Long Range Plan (to be issued in 2024)

Recommendations for Nuclear Physics Infrastructures

- **Collaboration with non-European infrastructures should be fostered in all areas of nuclear research to seize unique scientific opportunities and synergies that complement scientific programmes based in Europe. In particular, European participation in the construction of ePIC at the future international flagship facility EIC is recommended.**

EIC



"First time to my knowledge a non-European infrastructure is recommended at this level in the NuPECC Long Range Plan"

D. Bettoni at EIC RRB, May 2024

A special thanks to "our" members in the LRP process: PA, A. D'Angelo, ,S. Dalla Torre, M. Radici and many others from the large European EIC community

Recommendations for Hadron Physics

- **Future flagship facilities and experiments**

We recommend the expedited realisation of the antiproton experiment PANDA, and the support of European groups to contribute to the electron-ion experiment ePIC. By virtue of their different beam species and energy regimes, PANDA and ePIC will explore complementary physics aspects. In a ten-year perspective, these two next-generation experiments must be made ready to launch.

- **PANDA: The physics program, including the prospect of unravelling exotic matter, remains unique and compelling. PANDA will strengthen the European position on the global scene and act as a unifying force for the community. Therefore, we recommend support for its construction and for the development of instrumentation, software and analysis tools.**
- **ePIC: Here, European researchers will be able to explore unknown features of quarks and gluons inside nucleons and nuclei. We recommend supporting the participation of European groups in ePIC and reinforcing scientific and technological activities which synergize with European projects.**

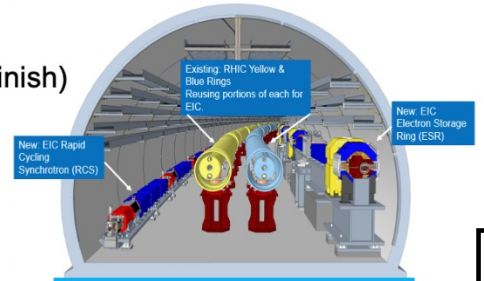
Status of the EIC project

Jim Yeck at 6-7 May EIC Resource Review Board

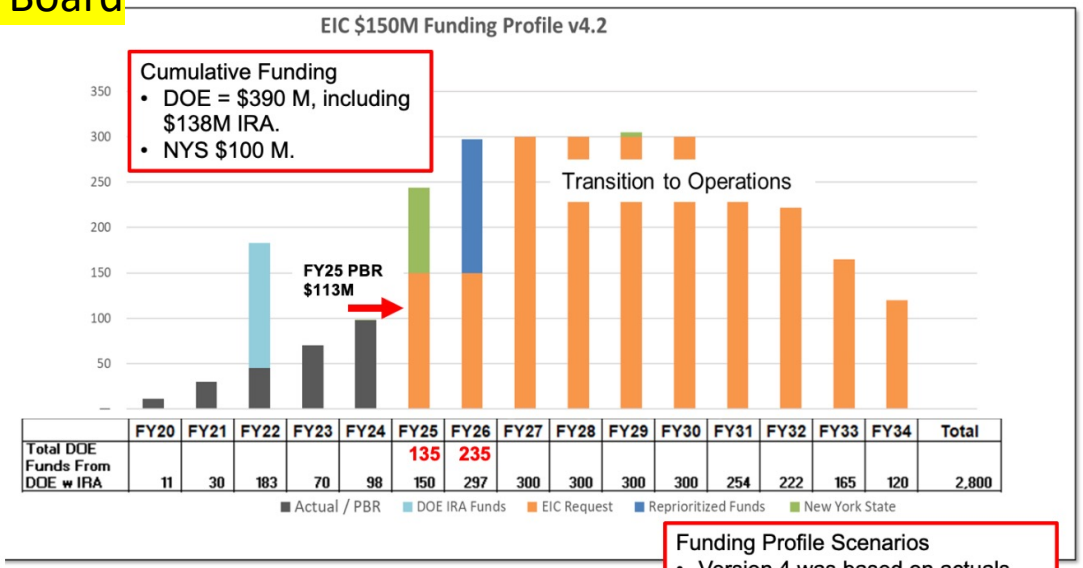
EIC Project Planning Snapshot

- CD-1 Alternative Selection and Cost Range= $1.7-2.8B
- Current TPC Point Estimate = $2.78B

- Plan for Critical Decision Approval Milestones (*Funding Dependent*)
  - Mar 2025 CD-3B, Long-Lead Procurement (Plan)
  - End 2025 CD-2/3, Performance Baseline/Construction Start (Target)
    - ➢ The goal is CD-2/3 before RHIC concludes in 2025
    - ➢ CD-3A,B,C,...enables procurement, not construction
  - 2026 CD-3 Start of Construction
  - 2033 CD-4 Start of Operations (Early Finish)
  - 2035 CD-4 Start of Operations



EIC Machine in the RHIC Tunnel



	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	Total
Total DOE Funds From DOE w IRA	11	30	183	70	98	135 150	235 297	300	300	300	300	254	222	165	120	2,800

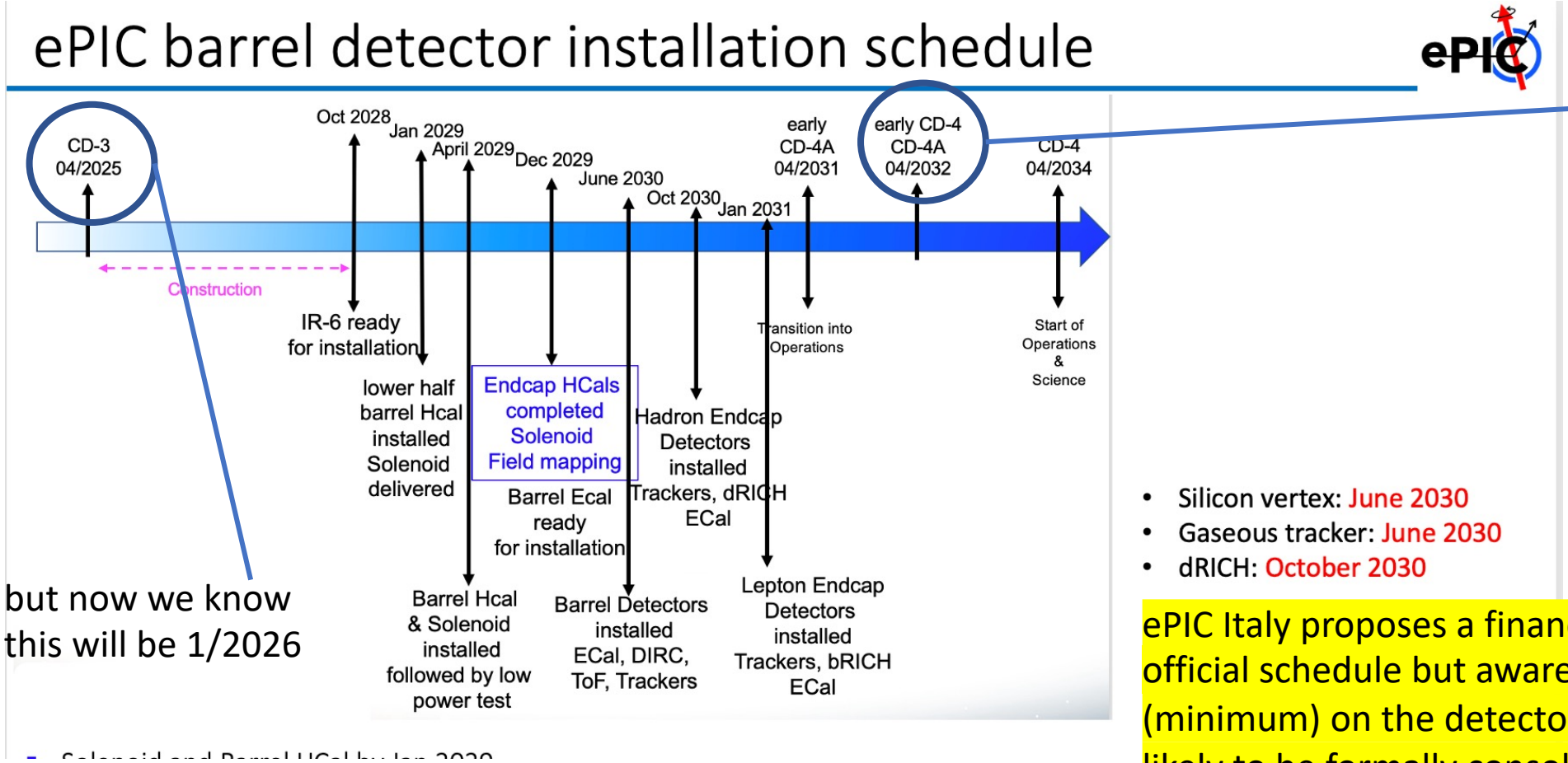
Funding Profile Scenarios
- Version 4 was based on actuals through FY23 (PBR) and forecasts.
- RHIC ops funding starts to be repurposed to EIC in FY2026.

Electron-Ion Collider
EIC RRB Meeting May 6-7, 2024 J. Yeck 12

Date	What and commentary
2030, October	Detector to be ready on the floor
2031	Accelerator starts, machine studies only
Late 2032/2033[1]	CD-4A (early CD-4) first stable beams physics run
2033-2034	EIC not working at full luminosity. E-ions runs likely to be exploited first. A rich physics program will be already explored thanks to the unique characteristics of the machine
2034	CD-4 (“project completion”) accelerator at design parameters

Status of the EIC project (2)

This was shown at December 2023 RRB, not yet formally changed



but now we know this will be 1/2026

but now we know this will be 1/2033

- Silicon vertex: June 2030
- Gaseous tracker: June 2030
- dRICH: October 2030

ePIC Italy proposes a financial plan according to this official schedule but aware a 6-months delay (minimum) on the detector installation schedule is likely to be formally consolidated by end of 2024

Last updates from the project

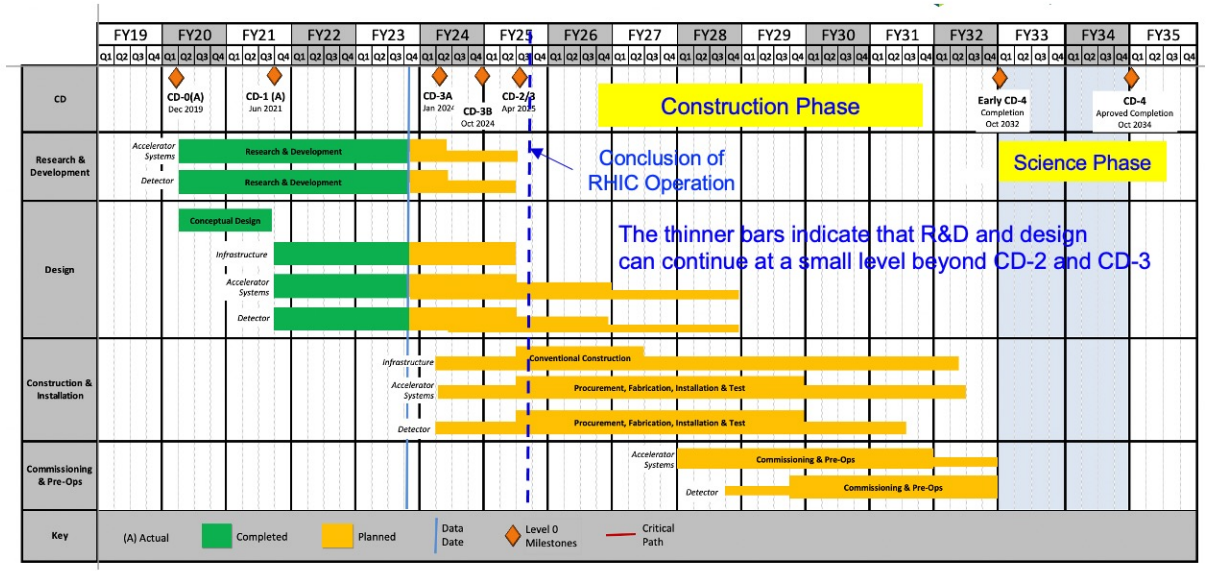
EIC Schedule – best guess, dates still under discussion

R. Ent

CD-3A:
Approve start of long-lead procurements
CD-3A items passed final design review
All interfaces related to them are frozen
Waiting for ESAAB meeting for authorization

CD-2:
Approve prelim. design for all subdetectors
Design Maturity: >60%
Need "pre-"TDR (or draft TDR)
Baseline project in scope, cost, schedule

CD-3:
Approve final design for all subdetectors
Design Maturity: ~90%
Need full TDR



This is still the official old one

Current EIC Critical Decision Plan

CD-0/Site Selection	December 2019 ✓
CD-1	June 2021 ✓
CD-3A	ESAAB March 25th 2024
CD-3B	**October 2024**
CD-2/3	**April 2025**
early CD-4	October 2032
CD-4	**October 2034**

September 2022 EIC received $138M DOE Inflation Reduction Act funding → CD3A

Updated Project Schedule: based on the actual appropriated FY24 funding ($98M), on uncertain FY25 budget scenarios (President's Budget is only ~$113M)

Updated EIC Critical Decision Plan

CD-0/Site Selection	December 2019 ✓
CD-1	June 2021 ✓
CD-3A	March 2024 ✓
CD-3B Review	**January 7-9 2025**
CD-2/3 Review	End of 2025
early CD-4	December 2034?
CD-4	December 2036?

This is Rolf/Elke current best guess
Note on the meaning of CD-4A… collisions in 2033 early 2034 anyway…

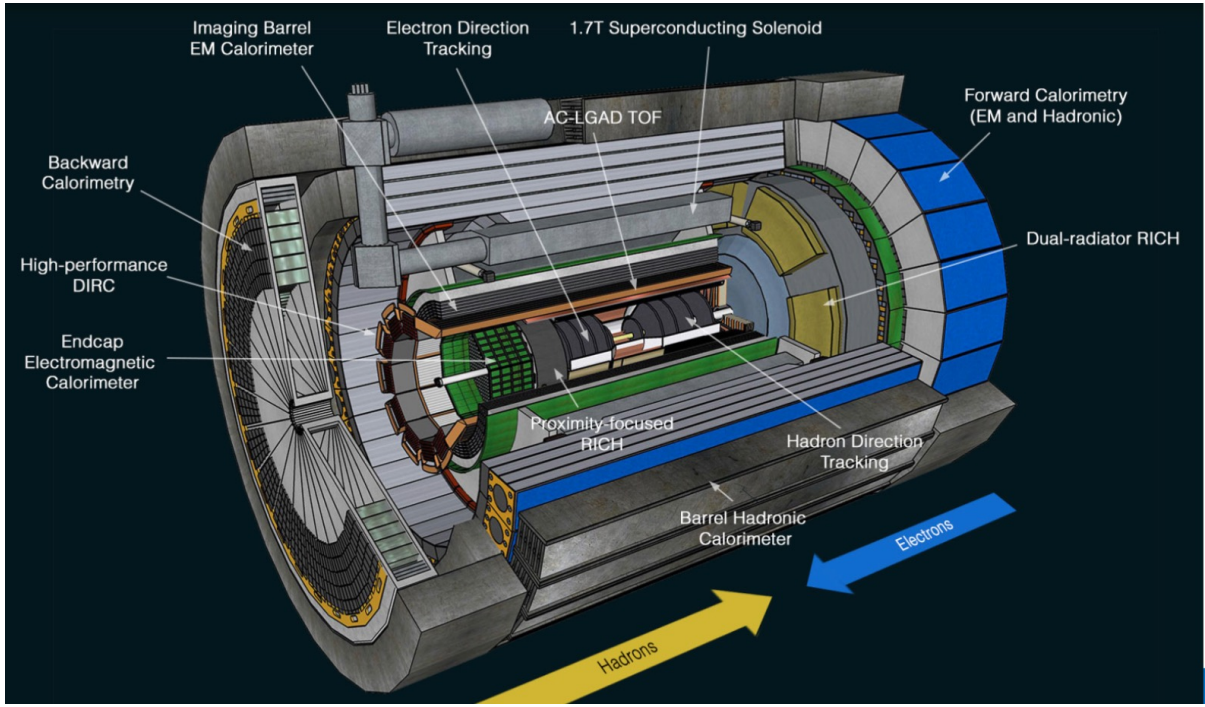
Electron-Ion Collider
ePIC biweekly meeting June 14, 2024

3

If this "guess" would be confirmed, ePIC – INFN spending profile might be further flattened
CSN3 chair request: to make things flatter we need to spend already since next year

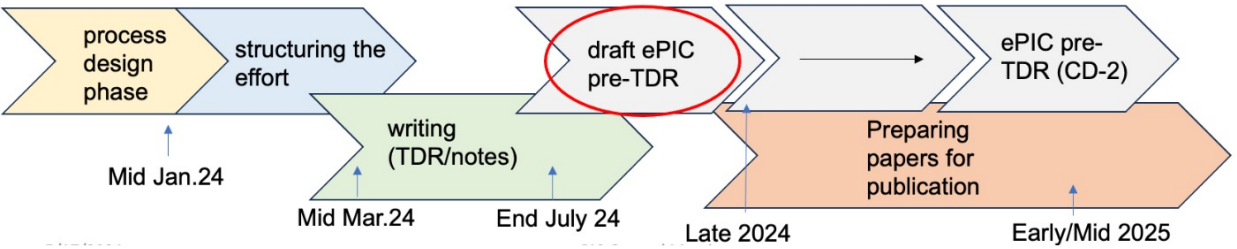
Status of the ePIC experiment

- ePIC will contribute to EIC pre-TDR for CD-2 in 2024, with "repeated cycle" in 2025 (for final TDR)
- UK, France and Italy expected to formalize IKC by end of 2024
- draft pre-TDR by end of 2024, pre-TDR (for CD-2) in 2025 →Silvia's talk



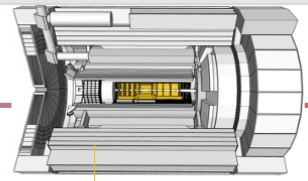
TDR Strategy and Publications

- In 2024 the ePIC collaboration will produce:
  - The ePIC contributions to the EIC TDR
    - The EIC TDR is the top priority
      - Chapters on *Physics Goals and Requirements* and *Experimental Systems*
      - Not just the document, but the simulations and detector R&D that form the basis
      - Requires close cooperation between the collaboration and the project!
- An ePIC Detector Design paper:
  - Derived and expanded from the *Experimental Systems* TDR chapter
- An ePIC Physics Performance paper:
  - Derived and expanded from the *Physics Goals and Requirements* TDR chapter
- Both to be published in a scientific journal (such as NIMA, JINST, or PRC)
- These publications will serve as a focus in developing the ePIC Membership and Publication policies.

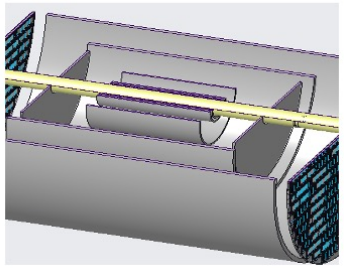


A recent and comprehensive full seminar about ePIC:
S. Dalla Torre CERN Detector Seminar (24th May 2024)

ePIC Tracking Detectors



μVertex Tracker



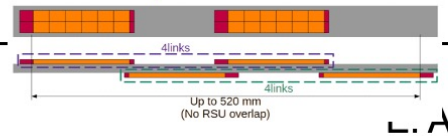
Excellent momentum 0.05%pT⊕0.5% and spatial resolution 20μm/pT⊕ 5μm

Displaced vertex reconstruction

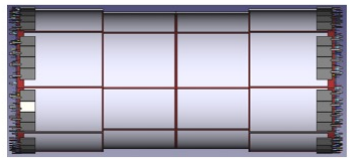
Monolithic Active Pixel Sensor → ALICE ITS3 MOSAIX sensor (65 nm) small pixels (~18 mm) and power consumption (<20 mW/cm^2)

Barrel Tracker

EIC Large Area Sensor (LAS), modification of ITS3 sensor with 5 or 6 RSU forming staves as the basic building elements for the Outer Barrel



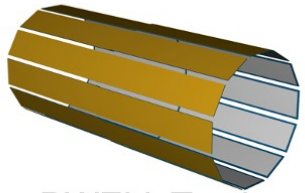
Outer Barrel MPGD Tracker



MicroMegas Tracker

Provide redundancy and pattern recognition for tracking

Cylindrical resistive Micromegas technology
Used: ATLAS NSW, CLAS12, SPHENIX, MINOS& T2K TPC



μRWELL Tracker

Tracking close to hpDIRC detector to improve angular and space point resolution. Redundancy and pattern recognition for tracking

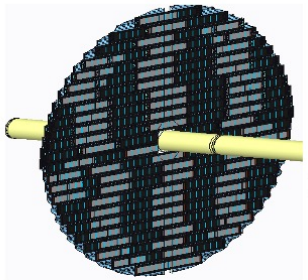
Main Function

Proven Technology

world's first at ePIC

24 planar Thin-gap & double amplification (GEM & μRWELL) modules & 2D-strip readout

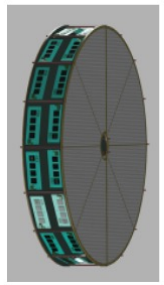
EndcapTracker



MAPS Disks

Excellent momentum 0.05 (0.10)% pT⊕1.0 (2.0)% and spatial resolution 30μm/pT⊕ (20 – 40) μm

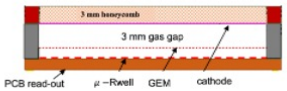
EIC Large Area Sensor (LAS), staves as the basic building elements for the MAPS disks



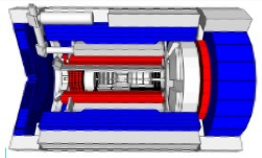
μRWELL Disks

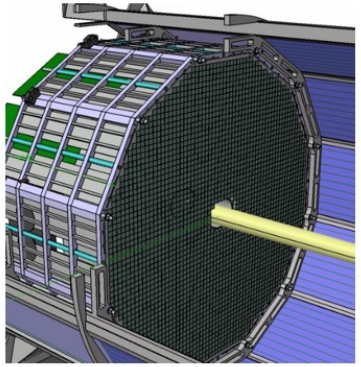
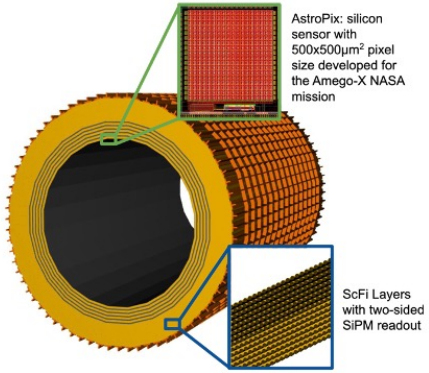
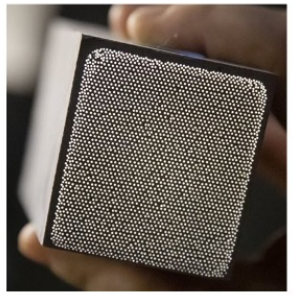
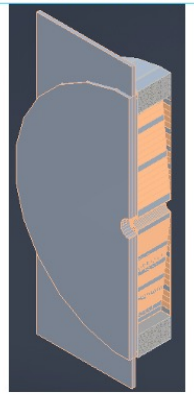
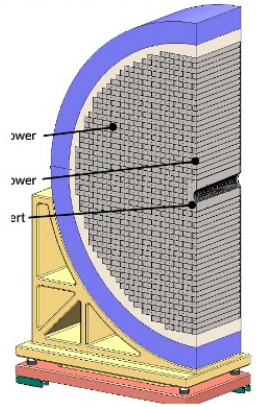
Provide redundancy and pattern recognition for tracking

GEM- μRwell hybrid configuration with increased gain

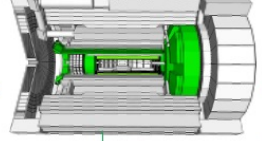


ePIC Calorimetry

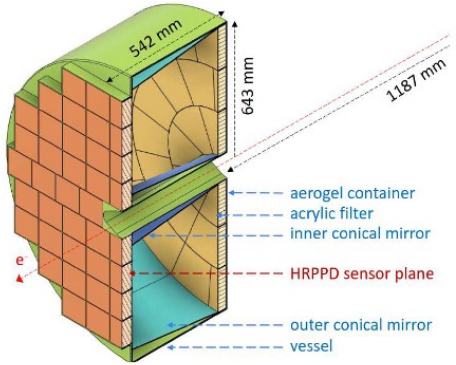


Backward ECal	Barrel ECal	Forward ECal	Backward HCal	Barrel HCal	Forward HCal
					
Main Function					
scattered lepton detection → very high-precision	scattered lepton and γ detection, hadronic final state characterization	lepton and γ detection, hadronic final state characterization → π^0, γ separation	muon and neutral detection → improved jet Energy reconstruction	muon and neutral detection → improved jet Energy reconstruction	particle-flow measurements
Proven Technology					
PbWO4 – crystals → long lead procurement	Pb/SciFi sampling part using SiPMs combined with imaging section (6 layers) interleaving Pb/SciFi with ASTROPIX	Tungsten-powder + SciFi SPACAL design Developed through EIC R&D and applied successfully in sPHENIX	Steel + Scintillator SiPM-on-tile	Steel + Scintillator design re-used from sPHENIX	longitudinal segmented Steel + Scintillator SiPM-on-tile Pioneered by CALICE analog HCal High resolution insert next to beam-pipe
SiPM as Photonsensors	Use of ASTROPIX in Calorimetry	world's first at ePIC			first-time full-size CALICE like calorimeter in collider experiment

ePIC Particle Identification Detectors



Backward RICH

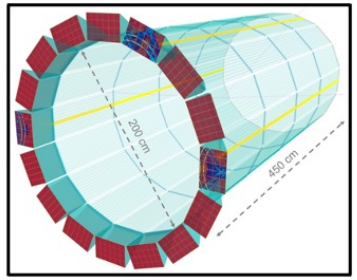


- e, π, K, p separation
→ π/K 3σ sep. up to 9 GeV/c and 10-20 ps timing → ToF

Classical single volume proximity focusing aerogel RICH with long proximity gap (~30 cm)

Photonsensors:
HRPPDs for Time-of-Flight

Barrel DIRC



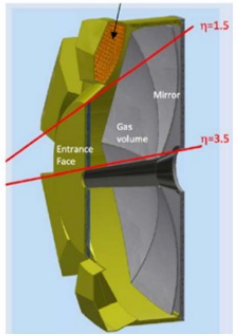
- e, π, K, p separation
→ π/K 3σ sep. at 6 GeV/c

Proven Technology

High Performance DIRC
- Quartz bar radiator
  → Reuse of BaBAR DIRC bars
- light detection with MCP-PMTs
- Fully focused

world's first at ePIC

Forward RICH



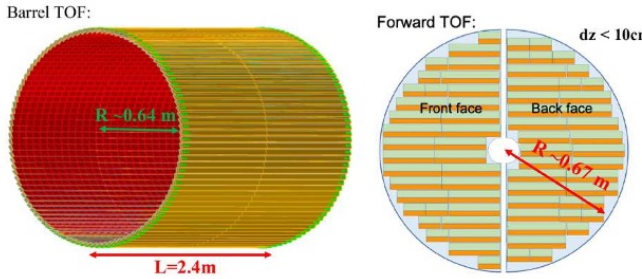
- e, π, K, p separation
→ π/K 3σ sep. up to 50 GeV/c

Proven Technology

Dual Radiator RICH
- Aerogel and C_2F_6 gas
- Spherical Mirrors (6 Azimuthal Sectors)
- Photon-Sensors tiled on spheres

First use of SiPMs as Photonsensors in a RICH

Time-of-Flight (Barrel, Forward)



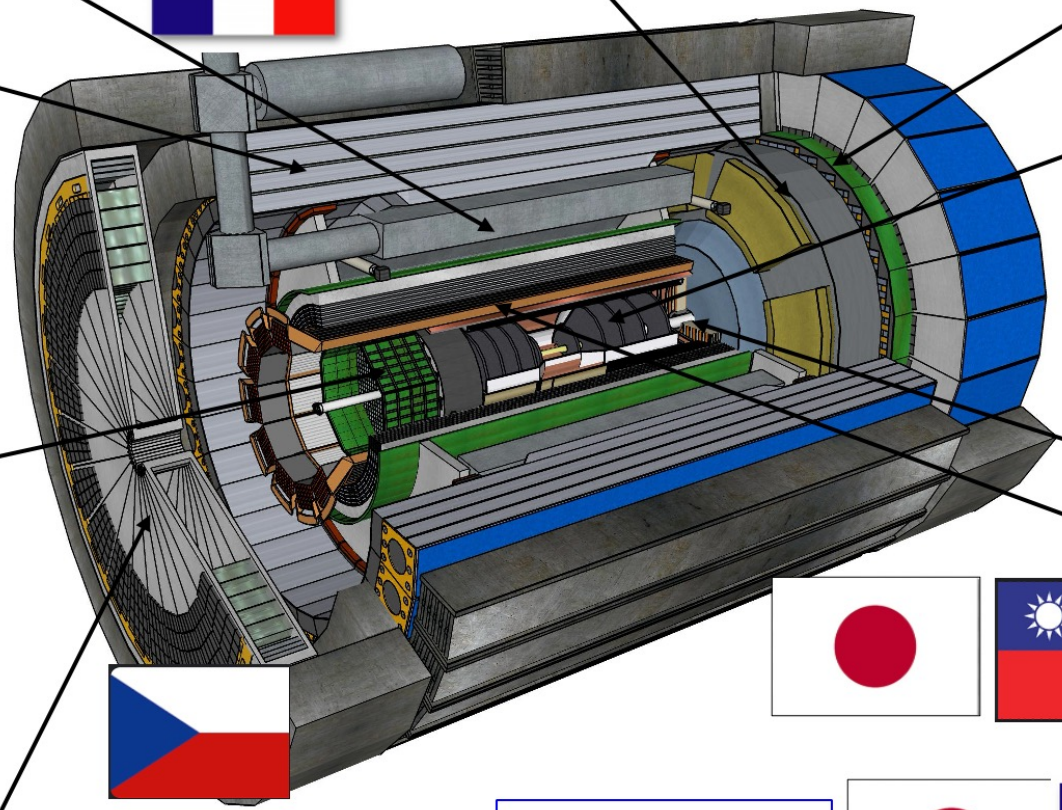
- e, π, K, p separation through 20-35 ps ToF

Barrel: $0.15 < p_T < 1.5$ GeV/c

Forward: $0.15 < p_T < 2.5$ GeV/c
- Accurate space point for tracking

First time use of AC-LGAD (Low Gain Avalanche Detector) in collider detector

Central Detector Non-DOE Interest & In-Kind



Superconducting Solenoid

Dual-radiator RICH

Forward Electromagnetic Calorimeter

Barrel Electromagnetic Calorimeter

Tracking Detectors

Backward Electromagnetic Calorimeter

Time-of-Flight

Backward Hadronic Calorimeter

Data-Acquisition Electronics

ePIC Collaboration Structure

Collaboration Council
Institutional Representatives

Spokesperson's Office
Spokesperson (SP)
Deputies

EIC Project

Executive Board

Standing Committees
DE&I
Conferences and Talks
Membership
Elections
Publications

Ad-Hoc Committees

Te  **rdinator**

Softwa Co  **nputing SCC)**

s Coo (AC)  **r**

Technical Coordinator (Acting)
- Silvia Dalla Torre (INFN)

Deputy TC's:
Prakhar Garg (Yale)
Oskar Hartbrich (ORNL)
Matt Posik (Temple)

SCC Coordinator
- Markus Diefenthaler (JLab)

Dmitry Kalinkin
(Kentucky, Deputy SCC for Development)
Torre Wenaus
(BNL, Deputy SCC for Infrastructure)
Wouter Deconinck
(U. Manitoba, Deputy SCC for Operations)

Analysis Co-Coordinators
- Rosi Reed (Lehigh Univ.)
- Salvatore Fazio (Univ. Calabria)

ePIC Working Group Structure

Red: International
Blue: New since last RRB

SPOKESPERSON'S OFFICE
J. Lajoie (ISU), Spokesperson
S. Dalla Torre (INFN), Deputy Spokesperson

TECHNICAL COORDINATION OFFICE
S. Dalla Torre (INFN, acting)
Prakhar Garg (Yale), Deputy
Oskar Hartbrich (ORNL), Deputy
Matt Posik (Temple), Deputy

ELECTRONICS, READOUT AND DAQ
Fernando Barbosa (JLab)
Jeff Landgraf (BNL)
Jin Huang (BNL)

PID
Thomas Ulrich (BNL)
Umberto Tamponi (INFN)

FAR FORWARD/ FAR BACKWARD
Simon Gardner (Glasgow)
Nathaly Santiesteban (UNH)

TRACKING
Ernst Sichtermann (LBNL)
Barak Schmookler (UCR)

CALORIMETRY
Oleg Tsai (UCLA)
Friederike Bock (ORNL)

SOFTWARE AND COMPUTING COORDINATOR
Markus Diefenthaler (JLab), Coordinator
Wouter Deconinck (Manitoba), Deputy
Dmitry Kalinkin (Kentucky), Deputy
Torre Wenaus (BNL), Deputy

PRODUCTION
Sakib Rahman (Manitoba)
Thomas Britton (JLab)

USER LEARNING
Holly Szumila-Vance (JLab)
Kolja Kauder (BNL)

VALIDATION
Tori Jeske (JLab)
Dmitry Kalinkin (Kentucky)

PHYSICS AND DETECTOR SIMULATION
Kolja Kauder (BNL)
Chao Peng (ANL)

RECONSTRUCTION
Shujie Li (LBNL)
Derek Anderson (ISU)

ANALYSIS TOOLS
Kong Tu (BNL)
TBD

STREAMING COMPUTING MODEL
Marco Battaglieri (INFN Genova)
Jin Huang (BNL)

ANALYSIS COORDINATORS
Salvatore Fazio (Unical)
Rosi Reed (Lehigh)

INCLUSIVE PHYSICS
Tyler Kutz (MIT)
Claire Gwenlan (Oxford)

SEMI-INCLUSIVE PHYSICS
Charlotte Van Hulse (Alcala)
Stefan Diehl (UConn)

EXCLUSIVE, FRACTION AND TAGGING
Raphael Dupre (Orsay)
Rachel Montgomery (Glasgow)

JETS AND HEAVY FLAVOR
Olga Evdokimov (UIC)
Brian Page (BNL)

BSM AND PRECISION EW
Ciprian Gal (JLab)
Michael Nycz (Virginia)

New Cross-Cutting WG Co-Conveners

ePIC DSC Structure

Red: International
Blue: New since last RRB

SPOKESPERSON'S OFFICE
J. Lajoie (ORNL), Spokesperson
S. Dalla Torre (INFN), Deputy Spokesperson

TECHNICAL COORDINATION OFFICE
Silvia Dalla Torre (INFN, acting)
Prakhar Garg (Yale), Deputy
Oskar Hartbrich (ORNL), Deputy
Matt Posik (Temple), Deputy

Detector Subsystem Collaborations

Particle Identification

dRICH
DSL/DSTC: Marco Contalbrigo (INFN)

hpDIRC
DSL/DSTC: Greg Kalicy (CUA)

BACKWARD RICH
DSL/DSTC: Alexander Kiselev (BNL)
Deputy DSL: Brian Page (BNL)

AC-LGAD TOF
DSL: Zhangbu Xu (Kent State)
Deputy DSL: Satoshi Yano (Hiroshima)

Calorimetry

BARREL ECAL
Co-DSL: Sylvester Joosten (ANL)
Co-DSL: Hwidong Yoo (Yonsei)
Deputy DSL: Maria Zurek (ANL)
DSTC (Si): Jessica Metcalfe (ANL)
DSTC (SciFi/Pb): Zisis Papandreou (Regina)

BARREL HCAL
Co-DSL: Stefan Bathe (Baruch)
Co-DSL: Megan Connors (GSU)

FORWARD ECAL
Co-DSL/DSTC: Oleg Tsai (UCLA)
Co-DSL: Huan Huang (UCLA)

BACKWARDS HCAL
DSL/DSTC: Leszek Kosarzewski (OSU)

FORWARD HCAL
DSL/DSTC: Friederike Bock (ORNL)
Deputy DSL/DSTC: Miguel Arratia (UCR)

BACKWARDS ECAL
DSL: Tanja Horn (CUA)
DSTC: Carlos Munhoz Camacho (IJCLab)

Far-Forward Far-Backward

FAR FORWARD
DSL: Alex Jentsch (BNL)
DSTC (B0): Zvi Citron (Ben-Gurion)
DSTC (Roman Pots/OMD): Alex Jentsch (BNL)
Co-DSTC (ZDC): Yuji Goto (RIKEN)
Co-DSTC (ZDC): Miguel Arratia (UCR)

FAR BACKWARD HIGH RATE TRACKER
DSL: Jaroslav Adam (CTU)
DSTC: Simon Gardner (Glasgow)

LUMINOSITY
Co-DSL: Nick Zachariou (York)
Co-DSL: Krzysztof Piotrzkowski (AGH Krakow)
DSTC (Pair Spectr.): Dhevan Gangadharan (Houston)

Tracking

Si TRACKERS
DSL: Ernst Sichtermann (LBL)
DSTC: Laura Gonella (Birmingham)

GASEOUS TRACKERS
DSL: Kondo Gnanvo (JLab)
DSTC: Maxence Vendenbroucke (Saclay)

ePIC Committees

Collaboration Council
Institutional Representatives

Standing Committees
DE&I
Conferences and Talks
Membership
Elections
Publications

Ad-Hoc Committees

DE&I Committee:
Chair: Megan Connors (GSU)
Vice-Chair: Christine Nattrass (UTK)
Francesco Bossù (CEA-Saclay), Wouter Deconinck (University of Manitoba), Narbe Kalantarians (Virginia Union
Maya
(Unive

Conferences and Talks:
Chair: Maria Zurek (ANL)
Vice-Chair: Brian Page (BNL)
Barba
Kalink
Nicola

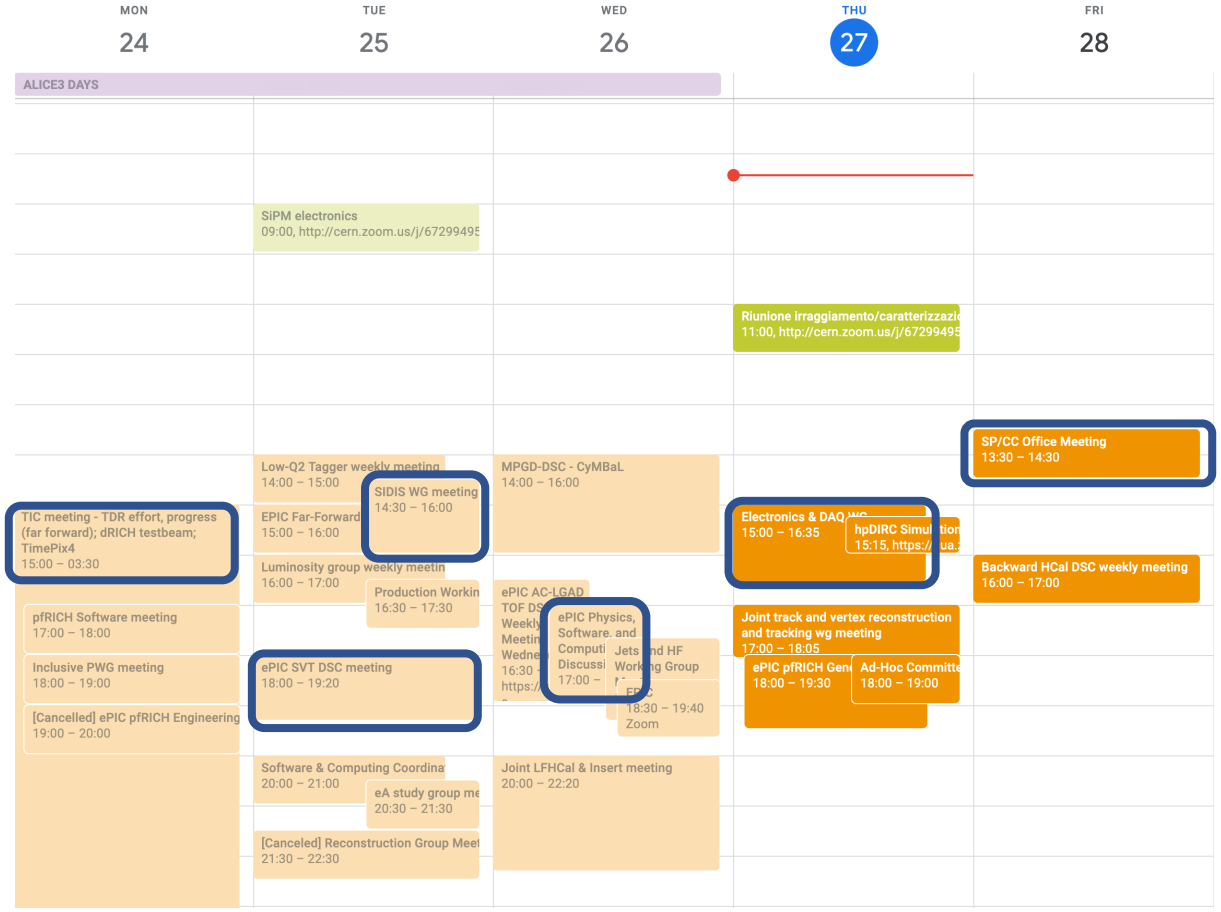
Membership Committee:
Chair: Peter Steinberg (BNL)
Vice-Chair: Pietro Antonioli (INFN-Bologna)
Friederike Bock (ORNL), Helen Caines (Yale), Doug
Higinbo
Niccola

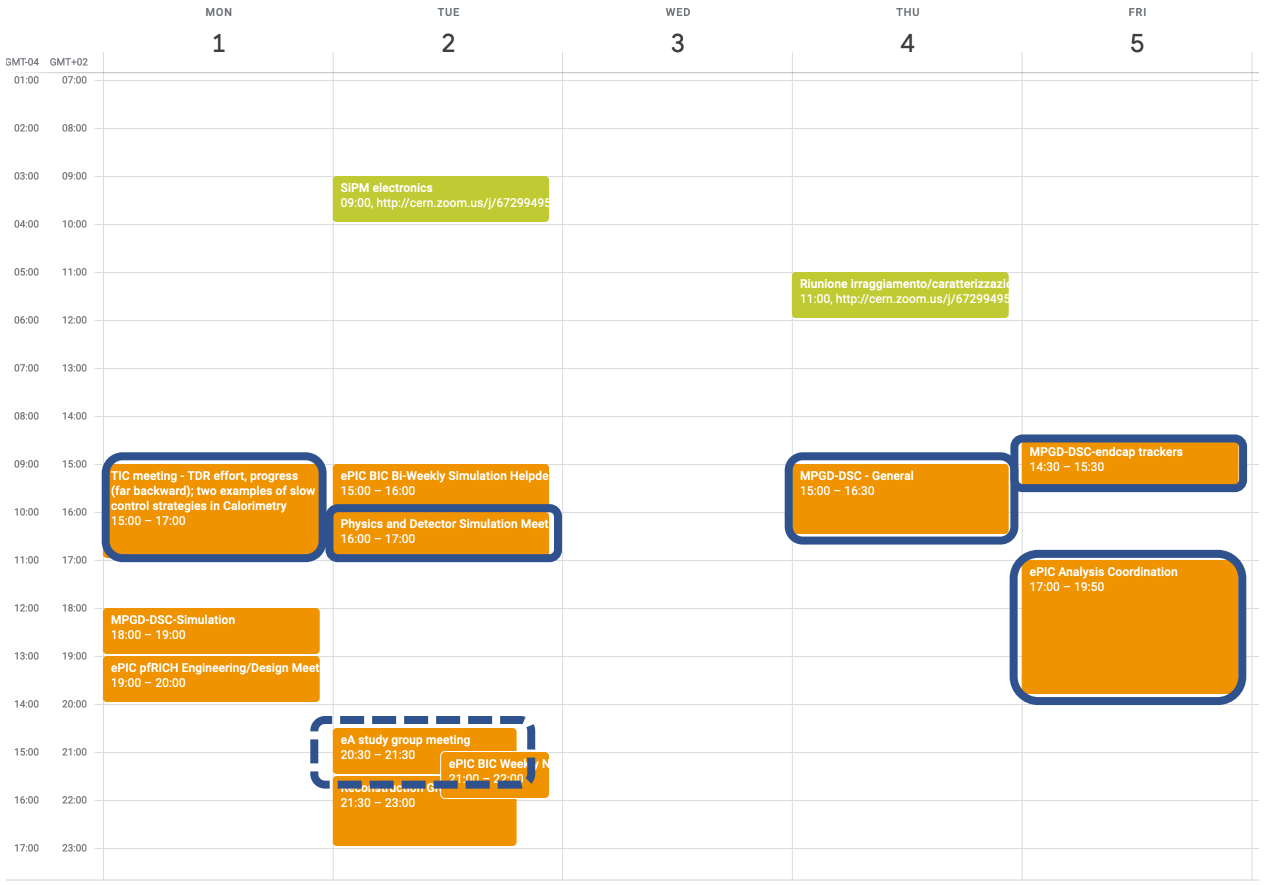
Elections Committee:
Chair: Helen Caines (Yale)
Vice-C
Past-C
Maria S

Publications Committee:
Chair: Rene Bellwied (U. Houston)
Vice –Chair: Annalisa Mastroserio (INFN Bari)
Lokesh Kumar (Panjab U.), Michela Chiosso (Torino), Prithwish Tribedy (BNL), Markus Diefenthaler (JLab), Sevil Salur (Rutgers),
ex-officio w. Conferences and Talks Committee:
Daniel Brandenburg (OSU)

All ePIC Standing Committees now formed and at work.

ePIC is already a “running” experiment…





Link to ePIC Italy Calendar (it should be used more by μRWELL, SVT… and generally alll!)

Link to ePIC Calendar

ePIC has already plenty of mailing lists

https://lists.bnl.gov/mailman/listinfo

Eic-projdet-background-l	[EIC-ePIC-Background-WG]
Eic-projdet-bsmew-l	[EPIC-BSM-EW-WG]
Eic-projdet-calo-l	[EPIC-Calo-WG]
Eic-projdet-calo-pemcal-l	EIC Project h-endcap EMCal
Eic-projdet-collab-l	[EPIC-Collaboration]
Eic-projdet-compsw-l	[ePIC Software & Computing]
Eic-projdet-conveners-l	[EPIC-Conveners]
Eic-projdet-cpid-l	[EPIC-CerPID-WG]
Eic-projdet-daq-l	[EPIC-DAQ-WG]
Eic-projdet-drich-l	ePIC dRICH mailing list
Eic-projdet-earlycareer-l	[EPIC-Early Career]
Eic-projdet-erd107-l	EIC Project eRD107 Hadronic Calorimetry Consortium
Eic-projdet-excldiff-l	[EPIC-ExclDiff-WG]
Eic-projdet-farback-l	[EPIC-FarBack-WG]
Eic-projdet-farforw-l	[EPIC-FarForward-WG]
Eic-projdet-globalint-l	[EPIC-GlobalInt-WG]
Eic-projdet-hpdirc-l	hpDIRC DSC mailing list
Eic-projdet-inclusive-l	[EPIC-Inclusive-WG]
Eic-projdet-jethf-l	[EPIC-JetHF-WG]
Eic-projdet-pfrich-electronics-l	ePIC pfRICH electronics mailing list
Eic-projdet-pfrich-l	ePIC pfRICH mailing list
Eic-projdet-pfrich-mechanical-design-l	ePIC pfRICH mechanical design mailing list
Eic-projdet-pfrich-software-l	ePIC pfRICH software mailing list
Eic-projdet-pid-l	The ePIC PID detector list
Eic-projdet-pwg-conveners-l	*[no description available]*
Eic-projdet-sc-l	[EPIC-SteeringGroup]
Eic-projdet-semiincl-l	[EPIC-SemiIncl-WG]
Eic-projdet-simqa-l	[EPIC SimQA WG]
Eic-projdet-tic-l	*[no description available]*
Eic-projdet-tofpid-l	[EPIC-ToFPID-WG]
Eic-projdet-tracking-l	[EPIC-Tracking-WG]
Eic-projdet-trk-recon-l	[EPIC-TrkRecon]

Epic-backward-hcal-l	*[no description available]*
Epic-bemcal-l	*[no description available]*
Epic-cc-membership-committee-l	*[no description available]*
Epic-sc-faq-l	*[no description available]*
Epic-svt-l	Mailing list for the ePIC SVT DSC
Epic-svt-uk-l	UK regional ePIC SVT discussion list
Epic-talks-l	*[no description available]*
Epic-website-l	*[no description available]*

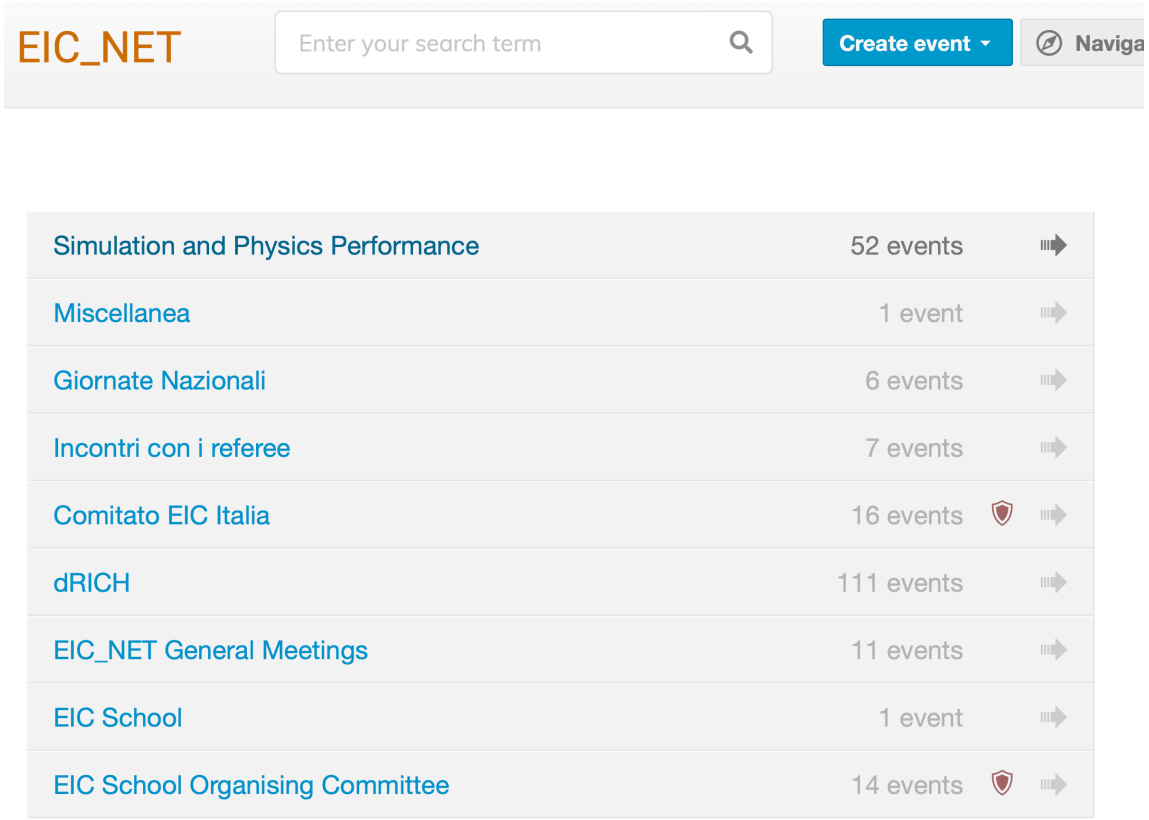
Please subscribe!

And check with your responsabile locale if you are registered as ePIC member (Institution representative must communicate to Collaboration Chair.

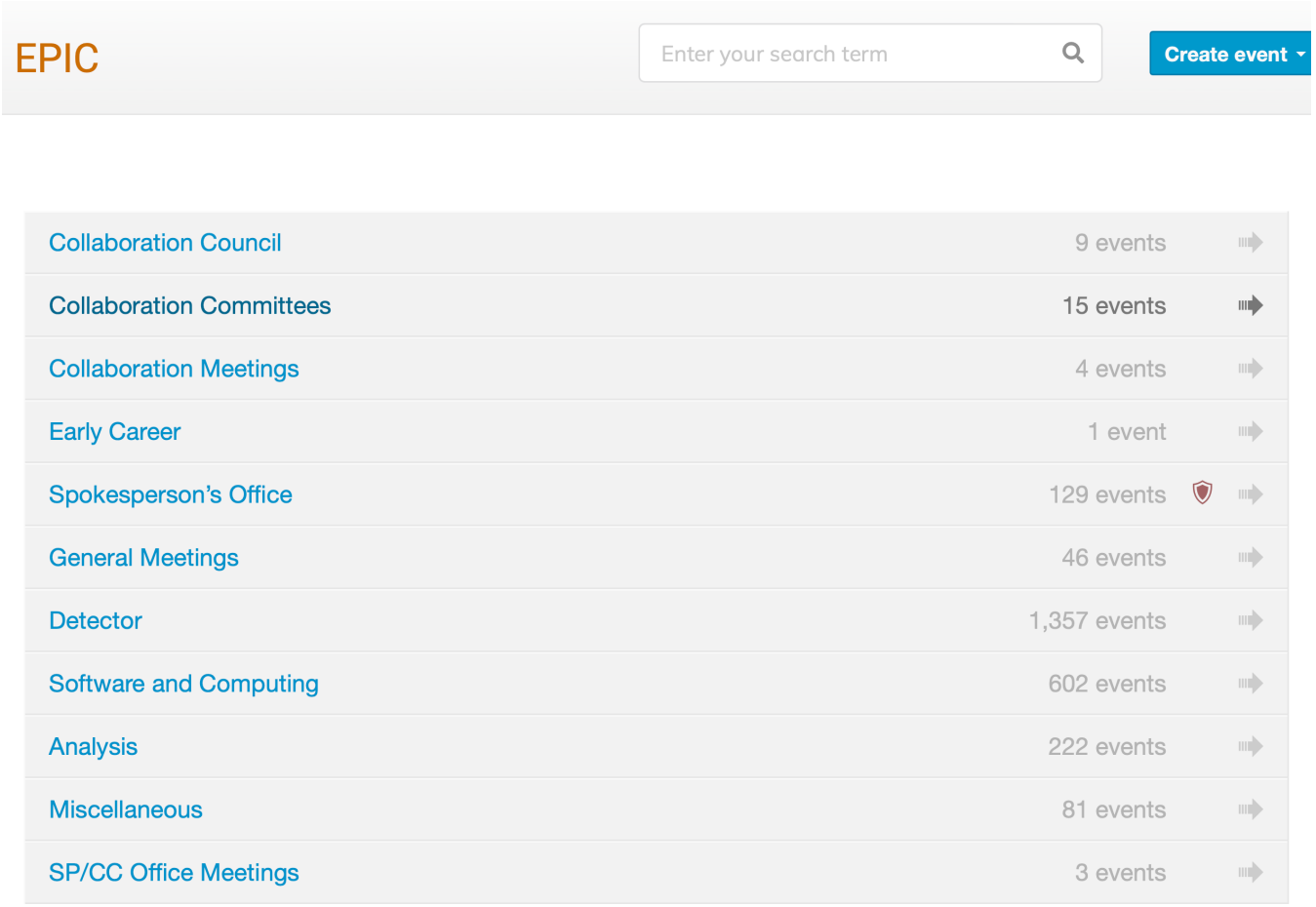
Existing eic_net_* mailing lists will be **migrated or deleted** during the Summer, ePIC_italy mailing list will replace eic_net_all we expect epic_* mailing list by detectors + two general (with one restricted to staff) + all the ones needed (ex. electronics, irradiation, …). INFN lists will be restricted to ePIC Italy members (with usual exceptions for technicians, tecnologi and undergraduate students when needed)

and we have two Indicos as well

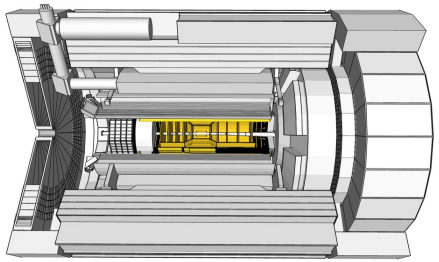
https://agenda.infn.it/category/1147/

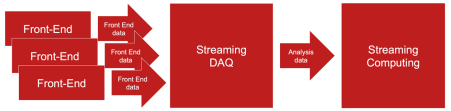


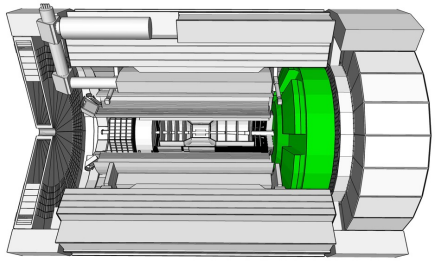
https://indico.bnl.gov/category/402/



ePIC Italy (and beyond) at a glance





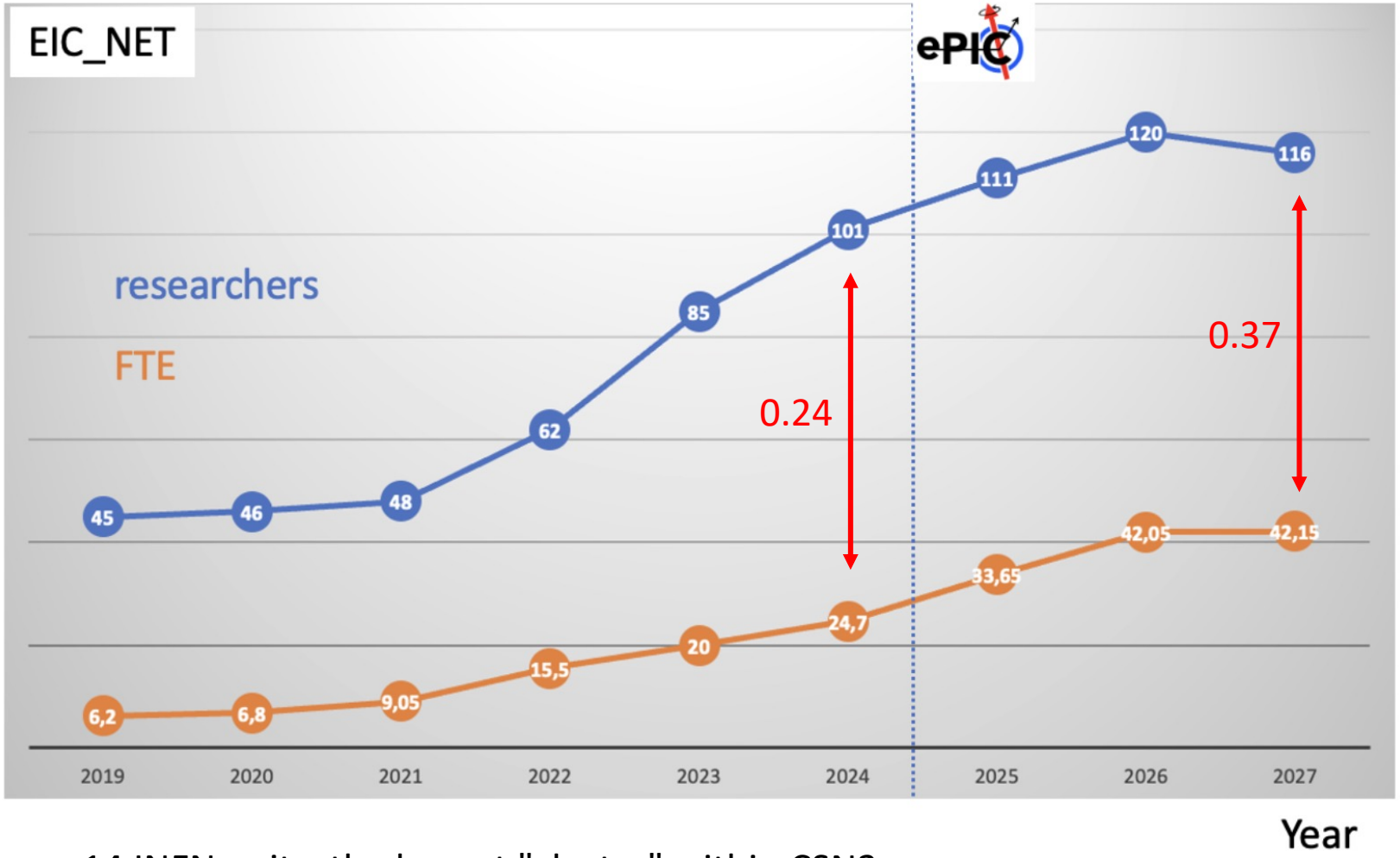


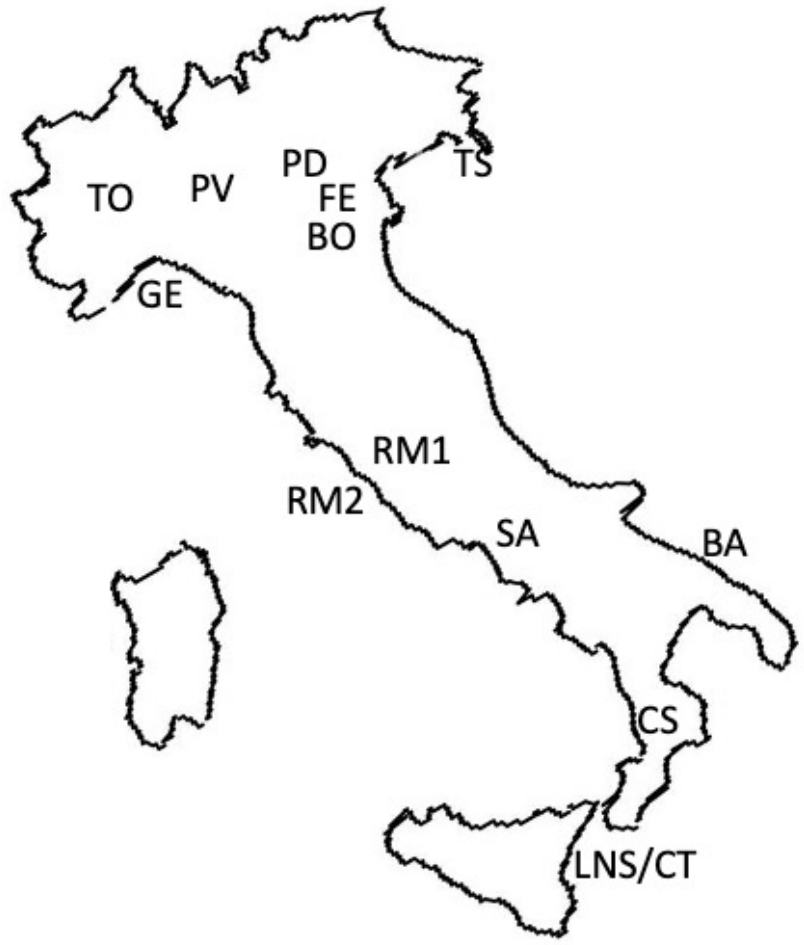
SVT	GT (μRWELL)	SRO	dRICH	Computing	Theory
BA PD PV TS	CT GE RM-TV	CT GE	BA BO CS CT FE GE LNS SA RM1 RM-TV TO TS		
D. Elia (BA) ALICE ITS3	A. D'Angelo (RM-TV) Jefferson Lab	M. Battaglieri (GE) Jefferson Lab	M. Contalbrigo (FE) ALICE ALICE3 (aerogel, SiPM)	A. Bressan (TS) (D. Elia (BA), A.Andronico (CT))	M. Radici (PV)

Domenico Elia (BA) is our INFN PI-elect, Domenico will replace Pietro, effective 1st Nov 2024

And don't forget EIC User Group (chair: M. Radici (PV), M. Ruspa (TO) also in EICUG SC): https://eicug.org
fundamental link with theory community + other common stuff (MC generators, lobbying, AI…)

ePIC Italy (who we are and how we plan to grow)



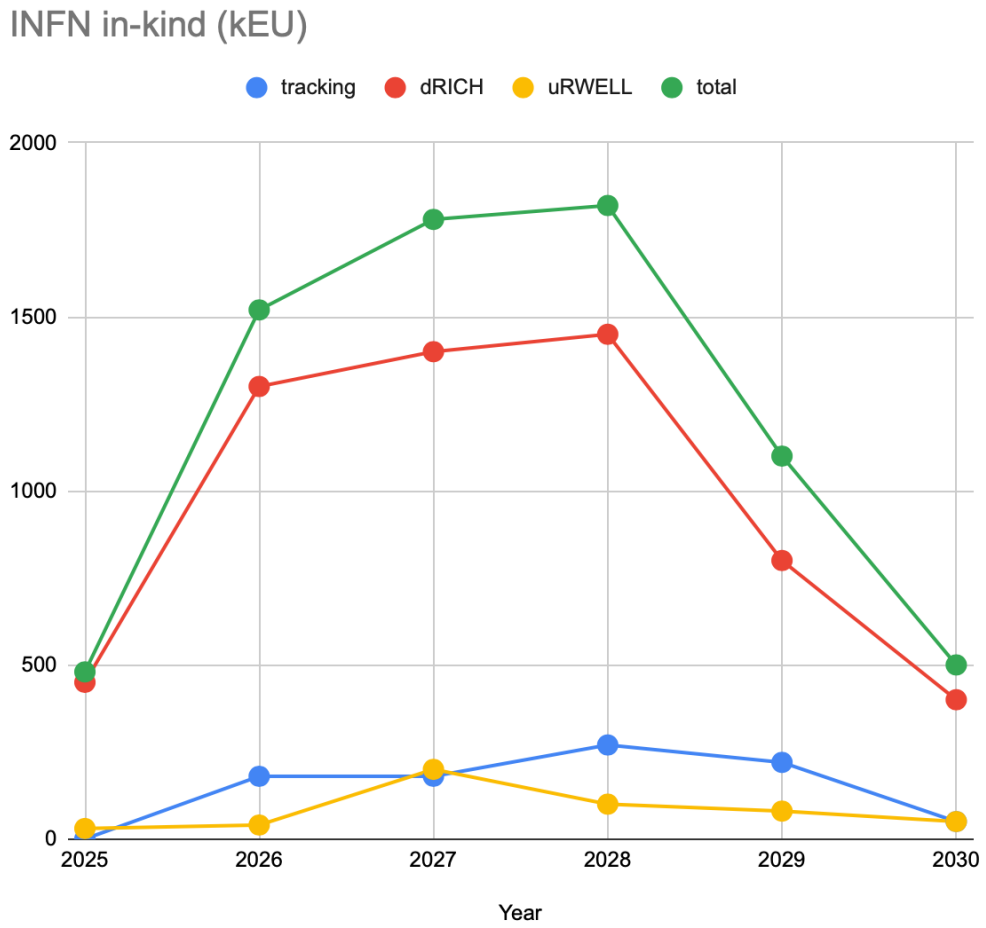


- 14 INFN units: the largest "cluster" within CSN3
- steady growth consistently with the project, **capacity to attract also from other CSN**
- **solid(*)** 3-year projections

(*) no senior associations, only contracts assigned or under recruitment

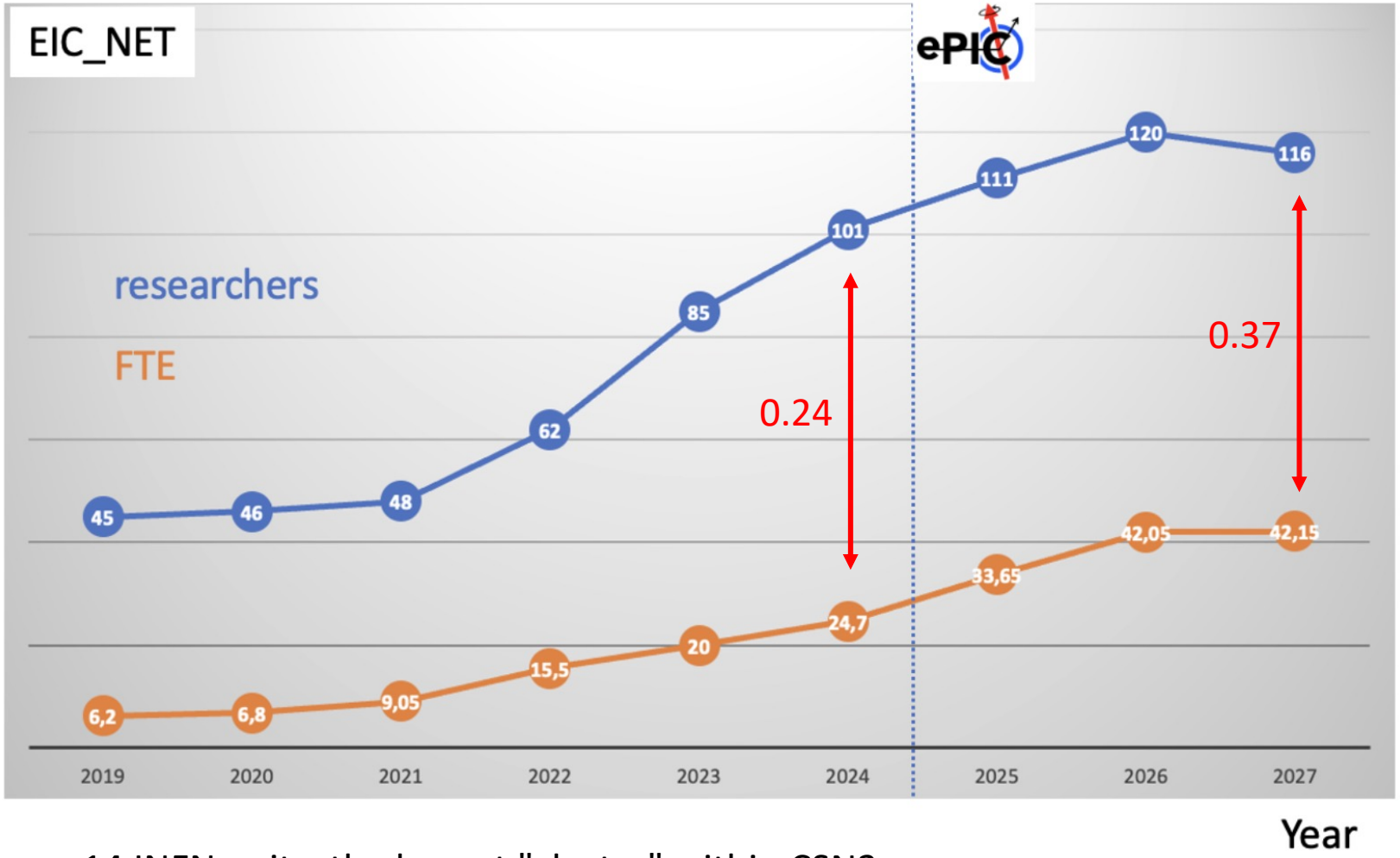
The INFN IKC

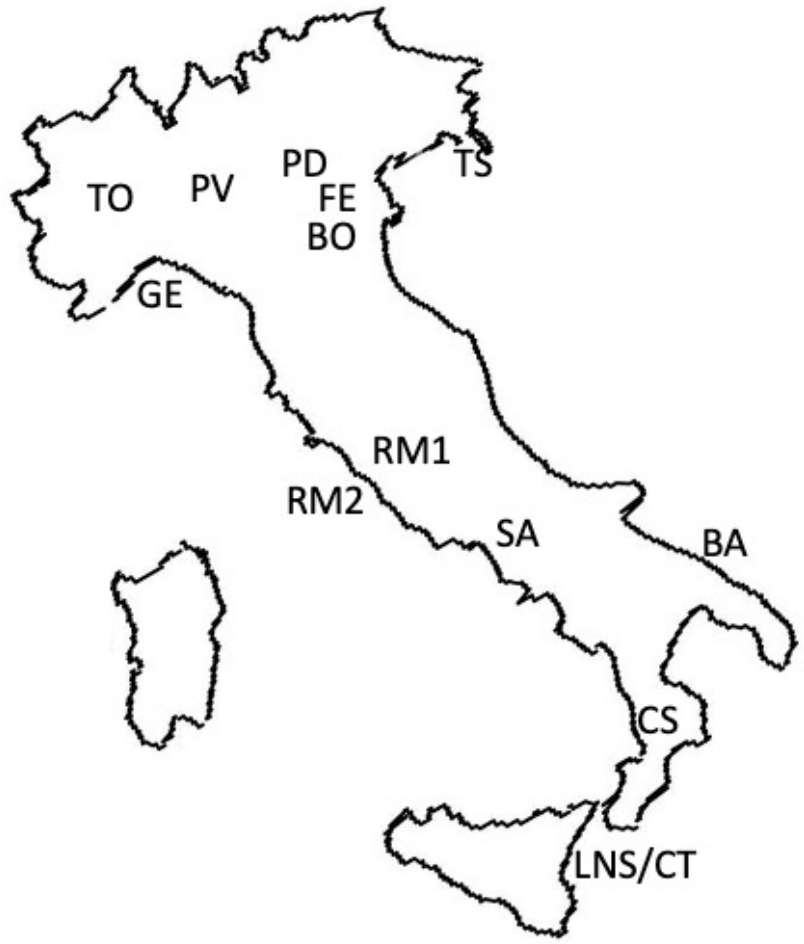
	INFN In-Kind (kEU)			
Year	SVT	dRICH	uRWELL	TOT
2025	0	450	30	480
2026	180	1300	40	1520
2027	180	1400	200	1780
2028	270	1450	100	1820
2029	220	800	80	1100
2030	50	400	50	500
	900	5800	500	7200
	Total IKC (EU)		7200	



- effort to avoid peak as much as possible (SVT vs dRICH)
- details on what is behind in dRICH, SVT and GEM-µRWELL presentations
- 2025 big item is ALCOR ER
- if at the end of this year the requirement of detector on the floor is moved to Oct. 2031 (instead of Oct. 2030) we can reasonably expect to avoid current peak in in 2027-2028
- **CSN3 input: need to spend!!** Even if there is a delay we should try to spend “consistent sum” already in 2025

Organization and FTE

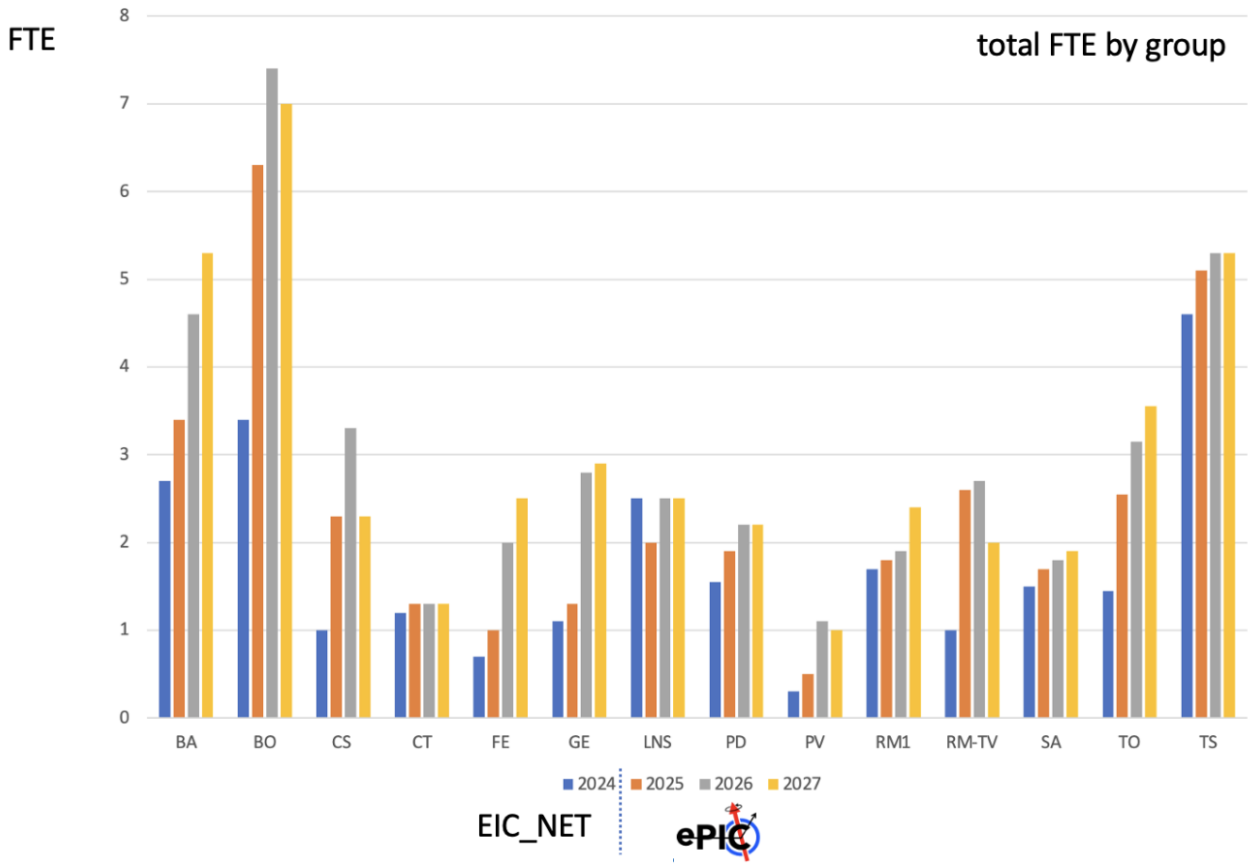


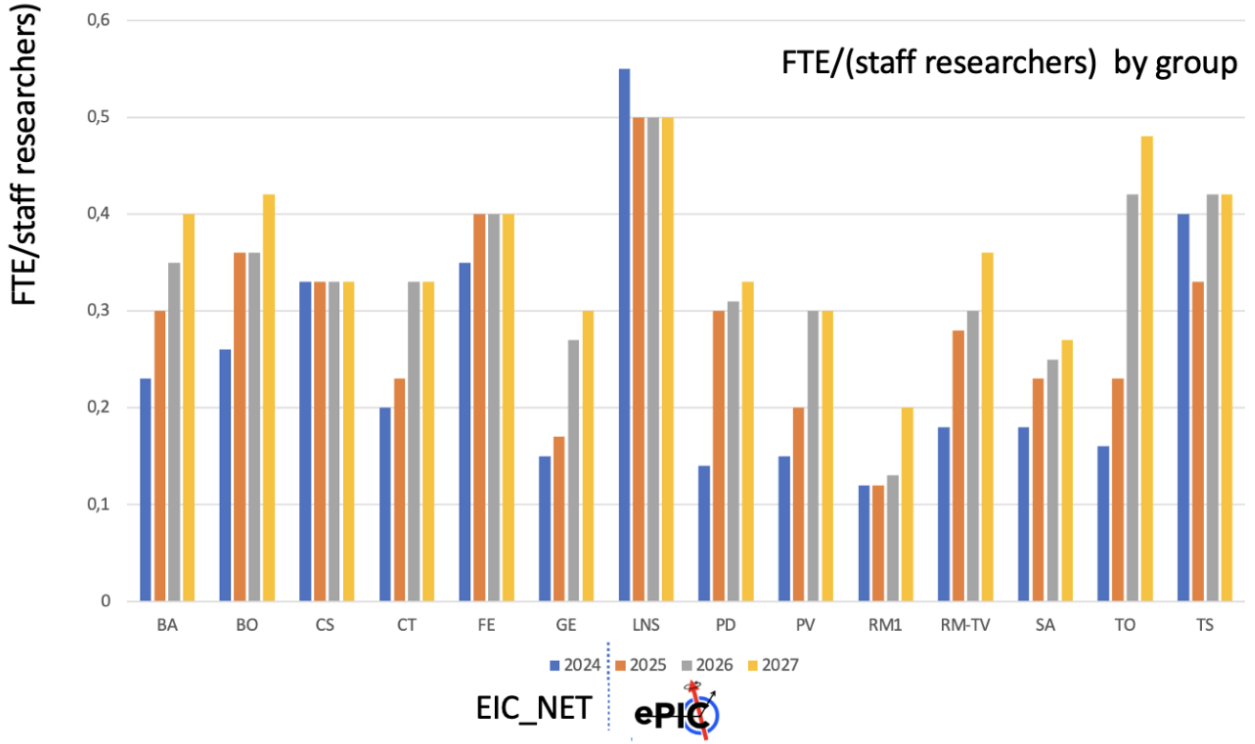


- 14 INFN units: the largest "cluster" within CSN3
- steady growth consistently with the project, **capacity to attract also from other CSN**
- **solid(*)** 3-year projections

(*) no senior associations, only contracts assigned or under recruitment

FTE by group



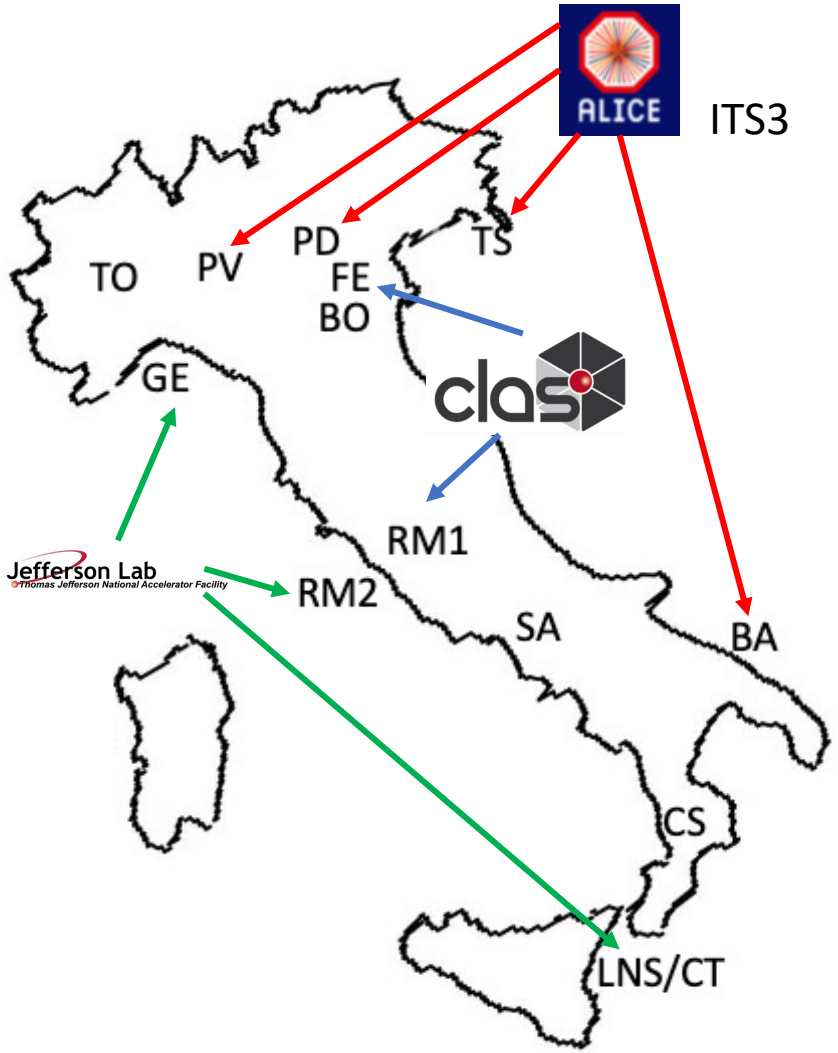


- all groups are growing
- 1.0 FTE threshold passed by all but one in 2025
- high engagement by RN and RL

- note on small Jlab groups and missions for shifts passed to INFN common referees
- what next? End of LHC Run3, and other stuff

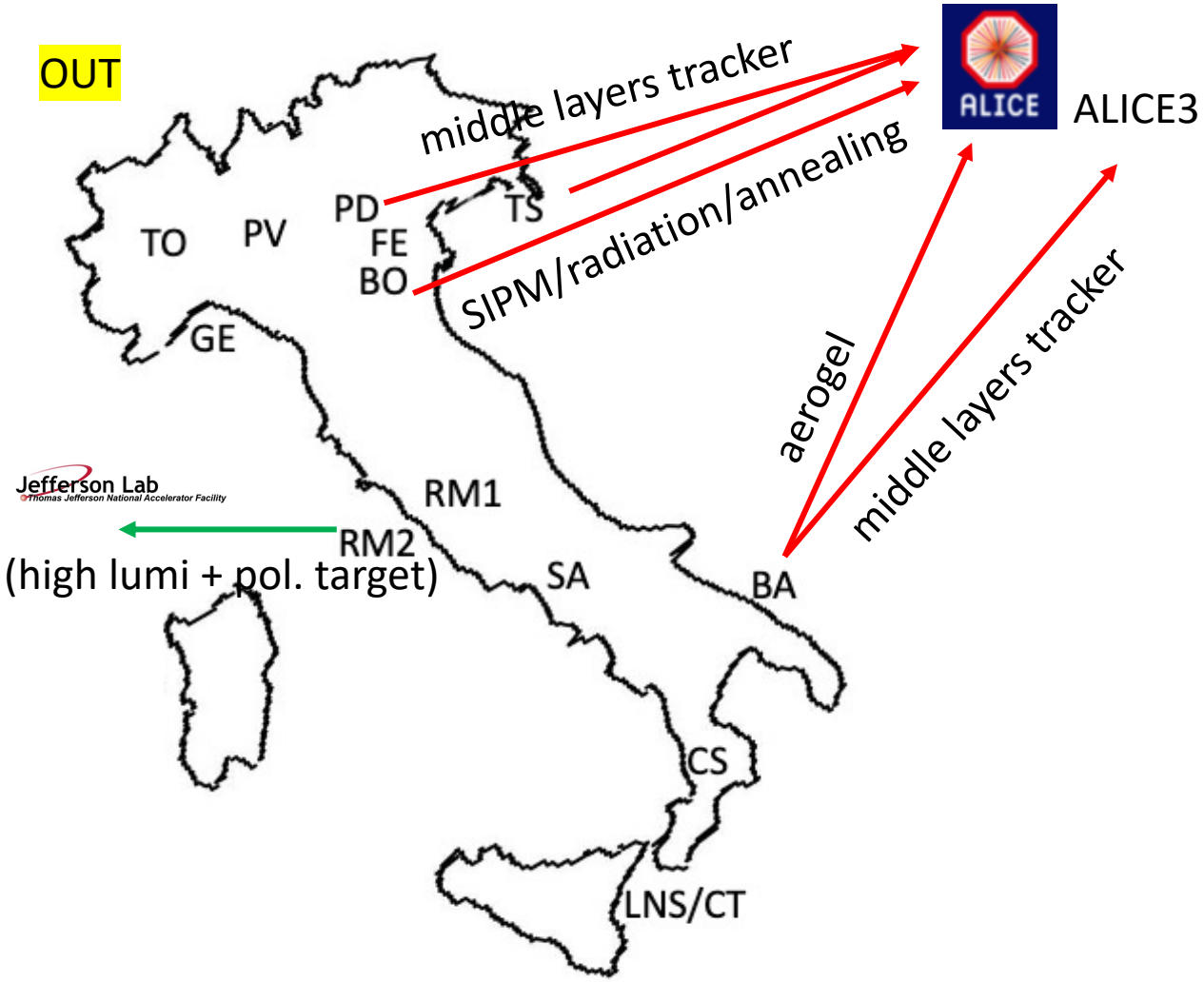
Synergies

IN



(plus expertise coming from ATLAS, BELLE, CMS COMPASS/AMBER, DARKSIDE, JUNO, NA62, STAR)

OUT



(plus ALCOR (TO) to be used in DUNE + IBIS_NEXT)

ICRADA and PPD

First Phase of EIC IKC identified areas

IKC Area	Activity ID and Name
Accelerator	6.06.02.02 IR Spin Rotator Magnets
Accelerator	6.08.04.03 1773 MHz 5-Cell Elliptical Cavity Cryomodule
Accelerator	6.08.04.05 394 MHz Crab Cryomodule
Accelerator	6.08.04.02 591 MHz 5-Cell Cryomodule
Detector	6.10.04.02 dRHIC Dual ring Cherenkov Detector
Detector	6.10.07 Detector Magnets Procurement
Detector	6.10.07 Detector Magnets Labor
Detector	6.10.03.01 Silicon Trackers (UK)
Detector	6.10.03.01 Silicon Trackers (INFN)
Detector	6.10.03.02 Micro Pattern Gaseous Detector (MPGD) Trackers
Detector	6.10.11.04 Low-Q2 Detectors
Detector	6.10.05.01 Backward Electromagnetic Calorimetry

The process of formalize the IKC is started.

Electron-Ion Collider
EIC RRB Meeting May 6-7, 2024 L. Lari 7

ICRADA No. 2024Sxxx

INTERNATIONAL

COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT

FOR

BASIC SCIENCE COOPERATION

(HEREINAFTER "ICRADA") NO. 2024SXXX

BY AND AMONG

JEFFERSON SCIENCE ASSOCIATES, LLC
UNDER ITS U.S. DEPARTMENT OF ENERGY CONTRACT
TO MANAGE AND OPERATE
THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY (JLAB)

(HEREINAFTER "LABORATORY")

AND

ISTITUTO NAZIONALE FISICA NUCLEARE (INFN)

(HEREINAFTER "PARTICIPANT")

LABORATORY AND PARTICIPANT COLLECTIVELY REFERRED TO

AS THE "PARTIES" AND SEPERATELY AS A "PARTY"

ICRADA to be signed by end of 2024
PPD to follow in 2025 (by June , for CD-2)

ANNNEX A

This collaborative project between JLab and INFN involves the design, procurement, fabrication and testing of key components of various sub-systems for the EIC detector, including the forward-region dual Ring Imaging Cherenkov (dRICH) particle identification detector, the inner three layers of the Silicon Vertex Tracking (SVT) detector, and the forward-region GEM-muRwell tracking detector disks.

Some miscellanea notes and this meeting

Invest in young generations

- Importance to share/accompanying our juniors (Mariangela and Simone are two good examples!)
- Initiatives as EIC European School are fundamental. Remember CFNS school every year
- Remember INFN-DOE Summer Student program
- INFN CSN3 “borse” for bachelor/master/just graduated students
- Importance to secure funds to travel in US

See S. Donati and M. Ruspa talks

We need to make a step on physics performance studies

See S. Fazio + M. Radici (+ L. Pelizzi /S. Kumar) talk

See dRICH/SVT/GEM-mRWELL sessions to learn about group activities

See D. Elia, M. Contalbrigo, A. D’Angelo talks

Some miscellanea immediate important coordination items:

- computing (→ with G. Carlino)
- upcoming DOE reviews (PDR and FDR) see backup
- “interaction tagger” and integration of RM1-RM2 work in dRICH workflow
- (obviously preventivi) → tomorrow
- (obviously applications for eRD/PED funds) → tomorrow

See S. Vallarino A. Lonardo talks

Next ePIC Collaboration Meeting

- Lehigh University Bethlehem, PA
  - July 22-28th
  - **Hybrid format**
- Jointly organized with the EICUG
- Joint EICUG/ePIC session with talks of common interest
- Mixed **workfest** and plenary sessions

https://indico.bnl.gov/event/20727/

(18 people from INFN attending from BA BO CS CT FE GE PV RM1 RM-TV TO TS)

Summary

exciting time to be an

- ~~right time to move to~~ "experiment sigla" with multi-year committment by INFN (ICRADA by end of the year)
- 6 years of R&D are repaying in terms of responsibilities and roles in the ePIC experiment
- large (14 units, O(50) FTE) CSN3 initiative for the decade to come
- INFN well positioned in major hadron physics experiment in the '30s

What is ePIC

JLab, Jan. 2023

Warsaw, July 2023

ANL, Jan. 2024

ePIC is a community of scientists dedicated to realizing the EIC science mission.

The ePIC Collaboration is as unique as the ePIC detector.

January 2025 Collaboration Meeting

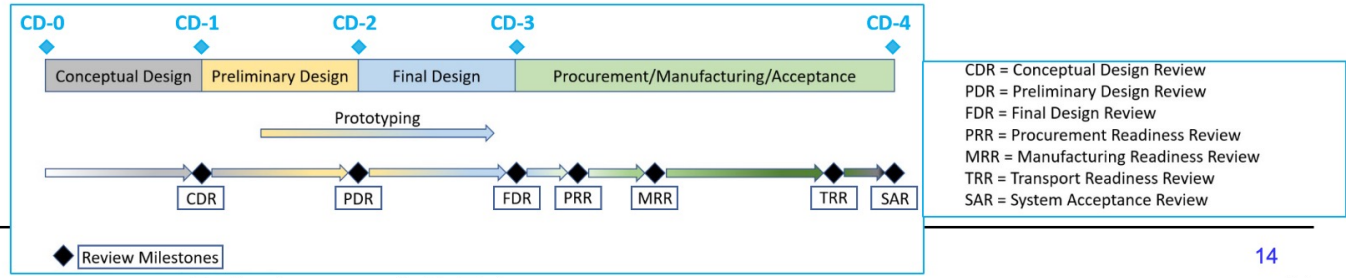
- After very careful consideration by the CC Office, Executive Board, and the Coordinators, we have decided to accept the proposal from University of Rome Tor Vergata & INFN to host the January 2025 ePIC Collaboration Meeting.
  - University of Rome Tor Vergata & INFN
    - Via Frascati (Roman Hills)
      - Trains from Fiumicino Airport and Roma Termini
  - Villa Mondragone
    - Rooms available at 3-4 star hotels in Frascati
    - Conference fee covers coffee breaks, lunches, shuttle buses:
      - Remote participants and students fee waived (up to 20%)
      - Minimum 100 in-person attendees
      - Social dinner (additional cost)
    - Plenary Room (160 people)
    - 3 parallel session rooms
    - AV support

Backup

Path to CD-2/CD-3B and to CD-3

- Preliminary and Final Design Reviews
  - ✓ **PDR2: IR Integration and Auxiliary Detectors – February 12, 2024** – main emphasis on baseline choices and progress
    Reviewers: Fulvia Pilat (ORNL), Gerrit Van Nieuwenhuizen (BNL), Wolfram Zeuner (CERN), Eugene Chudakov (JLab)
  - ✓ **PDR1: Tracking Detectors – March 20-21, 2024** – main emphasis on baseline tracking layout, if we are on track and plans
    Reviewers: Andy White (UTA), Michael Begel (BNL), Maxim Titov (CEA), David Lynn (BNL), Piotr Gasik (GSI)
  - PDR2: Electronics/DAQ – **Early June 2024** – continuation of PDR1 to ensure we are on track and show progress
  - PDR2: Particle Identification Detectors – Summer 2024?
  - PDR1: Integration, Infrastructure and Installation – September 2024 – includes detector support structures
  - PDR2: Barrel EM Cal – Summer/Fall 2024 – emphasis on mechanical design & AstroPix readiness (needs {PDR before CD-2)
  - PDR2: Polarimetry – timescale TBD (but before CD-2)

  - FDR: Magnet Power Supply – **aim for May 28, 2024** – final design review for **possible CD-3B scope**
  - FDR: VTRx+/lpGBT – included as ½ day in Electronics/DAQ review of early June 2024, **possible CD-3B scope**
  - FDR: Magnet flux return steel – September 2024 – included as final specifications in above PDR for **possible CD-3B scope**
  - FDR: Backward & Forward EM Calorimetry, Barrel & Forward HCAL – Fall 2024
- **Next ePIC Computing & Software review by host labs – ~October 2024**



Detector Non-DOE Interest & In-Kind

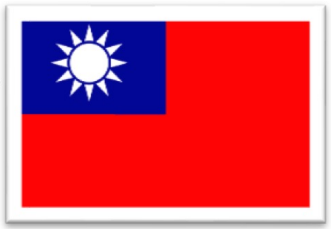
Entity	Interest and Important Facts
NSF	NSF-MSRI pre-proposal submitted by 10 US universities – aims at full scope of backward EM calorimetry (eECal). Armenia, Czech, France/IN2P3 as unfunded contributors. Invited to submit proposal. Moved within NSF to consider in MPS directorate. Internal NSF review completed. Pending funding decision.
CERN	MAPS sensor design developed by CERN/ITS-3 Group providing synergy with ALICE. Synergy of gaseous-based Cherenkov detectors and photon-sensors with ALICE & LHCb. Synergy of Forward AC-LGAD design with CMS endcap timing layer.
Armenia	Contributions, mainly labor to eECal and many EM calorimetry and particle id detectors component tests.
Canada	EIC included in 2022 Canadian Subatomic Physics Long-Range Plan; Interested in Barrel Electromagnetic Calorimetry, Electron Polarimeter and Software. Working on 2024 proposal.
China	Interested in Forward EM Calorimeter – working on NSF-China proposal.
Czech	Working with funding agency; Interested in eECal (PbWO4 crystals and glass), Silicon Vertex Tracker sensors and characterization, and collaboration on low-Q2 electron tagger.
France/IRFU	Interested in MPGD/racking and readout electronics including ASICs for MPGDs. Provided in-kind contributions to SC magnet design and interested to continue labor oversight during magnet construction.
France/IN2P3	International contribution to backward EM calorimetry (including in-kind design) and to readout electronics (in-kind design of two ASICs for AC-LGAD detectors and Calorimetry). IRFU & IN2P3 discussing together for higher-level contributions.
India	EIC included in 2023 Mega Science Vision Plan. Consortium is working with Funding agency; Interested in detector software (non-project scientific contribution), contributions to DAQ/slow controls and forward dRICH. Investigating further hardware contributions – forward EM Calorimeter, forward AC-LGAD, maintain possible links with Si groups and plants.
Italy/INFN	Commitment to EIC detector magnet construction scope. Aims at major scope of forward particle identification detector (dRICH) including ASICs development, at (part of) the Si/MAPS tracker scope, and at photo-sensor contributions as well as contributions to the μRwell. Tracker (forward disks)..
Israel	B0 Detectors (Si tracking and PbWO4)
Japan	Interested in a US-Japan agreement; Aims at full scope of Zero-Degree Calorimeter in collaboration with Taiwan/Korea. Pursuit of full scope of barrel AC-LGAD detector as EIC-Asia consortium. Contribution to DAQ/streaming.
Korea	Aims at major scope for fiber-based barrel EM calorimeter, Also interest in barrel AC-LGAD and Si-based hadronic calorimetry for ZDC.as part of EIC-Asia consortium (includes also Japan,Taiwan), Si tracking detector and GEM-based detectors. Proposal submitted to MSIT.for M&S for barrel EMCal and support for labor for all interests. In policy review stage.
Poland	Actively working with ministry/funding agency; Interested in detectors along the beam line (luminosity detector, Roman Pots)
Taiwan	Pursuit of full scope of barrel AC-LGAD as part of EIC-Asia consortium. LYSO-based EM calorimeter for ZDC, Also optical readout/fiber. Possible later interest in PCBs. Computing. Also investigating if AC-LGAD sensors can be produced by Taiwan industry, if so these sensors could be in-kind.
UK	STFC seed funding for UK detector R&D (3M£). Large STFC/UKRI research infrastructure proposal approved, includes the two outer barrel layers of the silicon vertex tracker, two tracking stations for the low-Q2 electron tagger, and components for the luminosity monitor. Also includes accelerator component.

This slide is usefus as flag legend ;-)

May 2024 RRB Meeting Participants

CANADA
TRIUMF

Israel
Ben-Gurion University



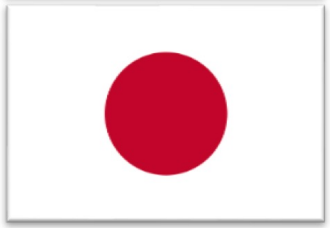
Taiwan
National Central University
National Taiwan University

Czech Republic
Ministry of Education, Youth and Sports

Italy
INFN

United Kingdom
STFC
University of Birmingham
University of Glasgow

France
IN2P3/CNRS
CEA Saclay



Japan
Tokyo University
RIKEN

United States
DOE
BNL
JLAB
ORNL

India
Department of S&T

South Korea
MIST
UConn
Yonsei University

Working together to support the EIC research program!