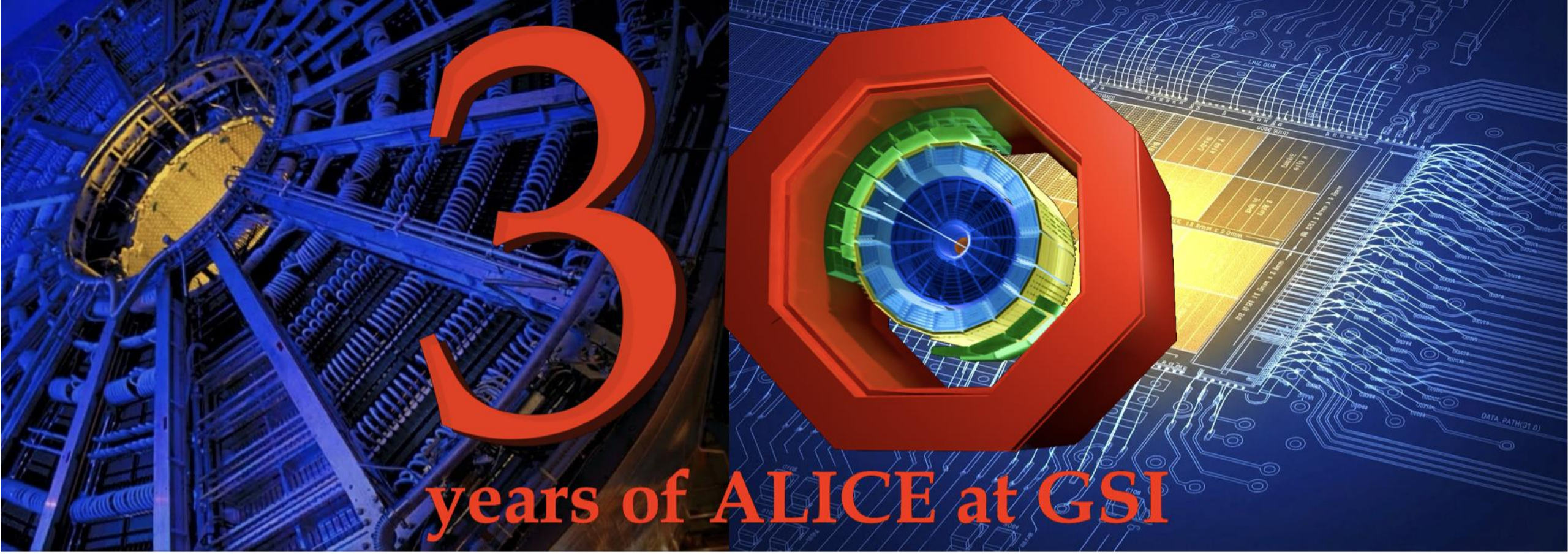


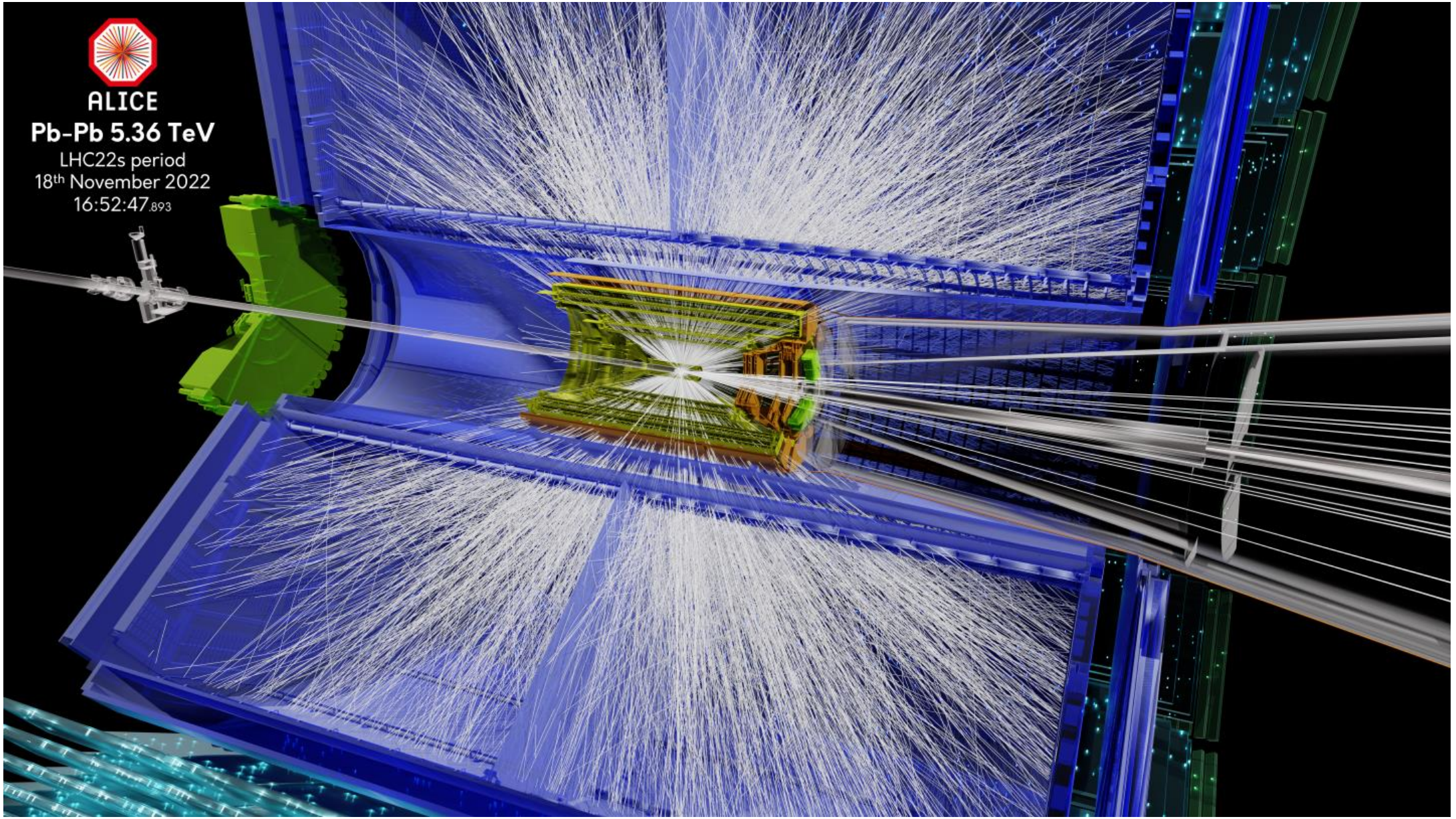
Group History

Ralf Averbeck

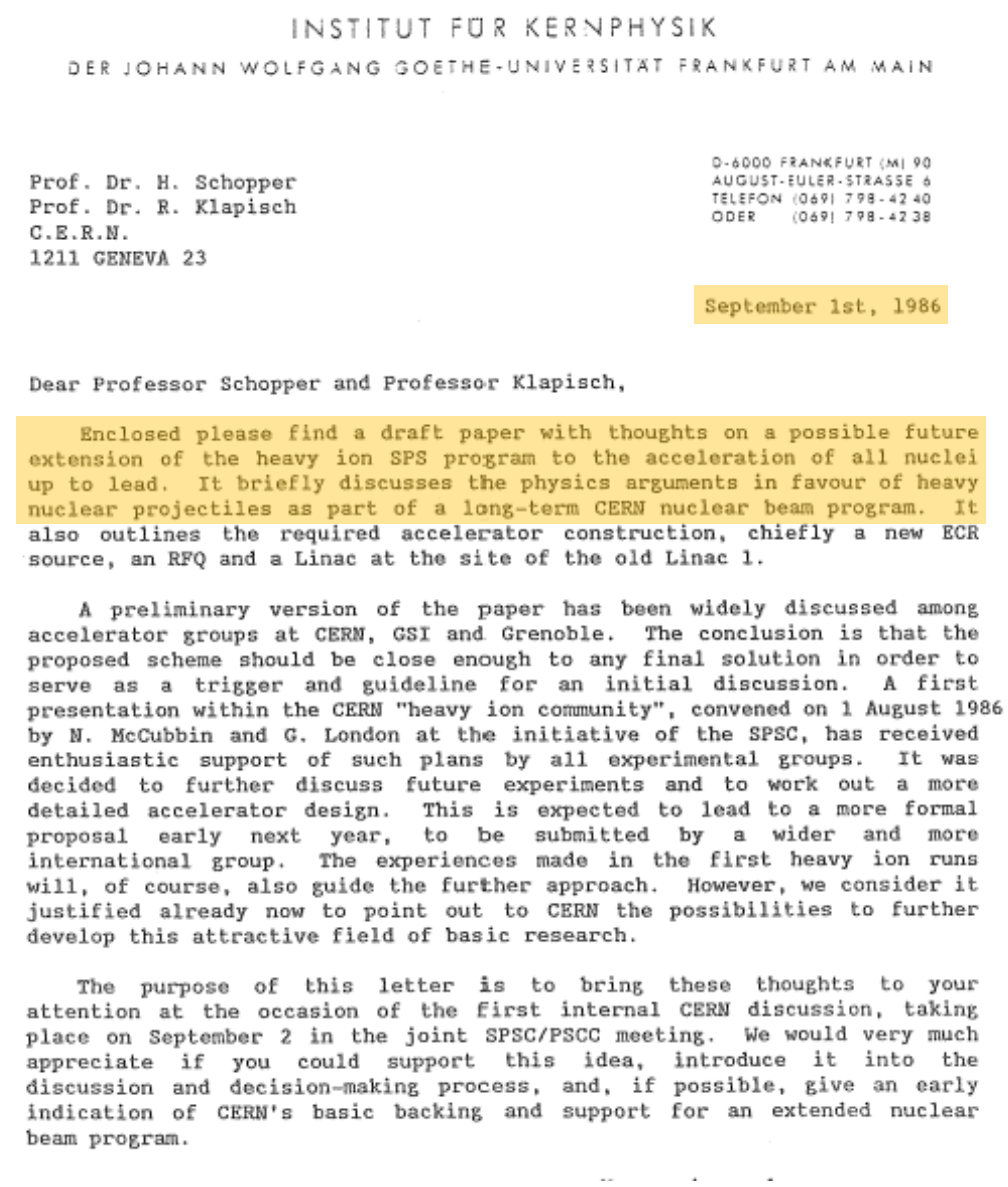
GSI, November 3, 2026

relying heavily on material from Silvia Masciocchi, Dariusz Miskowiec, and others

How did “we” come to this point?



Fertile ground …



INSTITUT FÜR KERNPHYSIK

DER JOHANN WOLFGANG GOETHE-UNIVERSITÄT FRANKFURT AM MAIN

Prof. Dr. H. Schopper
Prof. Dr. R. Klapisch
C.E.R.N.
1211 GENEVA 23

D-6000 FRANKFURT (M) 90
AUGUST-EULER-STRASSE 6
TELEFON (0691) 798-42 40
ODER (0691) 798-42 38

September 1st, 1986

Dear Professor Schopper and Professor Klapisch,

Enclosed please find a draft paper with thoughts on a possible future extension of the heavy ion SPS program to the acceleration of all nuclei up to lead. It briefly discusses the physics arguments in favour of heavy nuclear projectiles as part of a long-term CERN nuclear beam program. It also outlines the required accelerator construction, chiefly a new ECR source, an RFQ and a Linac at the site of the old Linac 1.

A preliminary version of the paper has been widely discussed among accelerator groups at CERN, GSI and Grenoble. The conclusion is that the proposed scheme should be close enough to any final solution in order to serve as a trigger and guideline for an initial discussion. A first presentation within the CERN "heavy ion community", convened on 1 August 1986 by N. McCubbin and G. London at the initiative of the SPSC, has received enthusiastic support of such plans by all experimental groups. It was decided to further discuss future experiments and to work out a more detailed accelerator design. This is expected to lead to a more formal proposal early next year, to be submitted by a wider and more international group. The experiences made in the first heavy ion runs will, of course, also guide the further approach. However, we consider it justified already now to point out to CERN the possibilities to further develop this attractive field of basic research.

The purpose of this letter is to bring these thoughts to your attention at the occasion of the first internal CERN discussion, taking place on September 2 in the joint SPSC/PSCC meeting. We would very much appreciate if you could support this idea, introduce it into the discussion and decision-making process, and, if possible, give an early indication of CERN's basic backing and support for an extended nuclear beam program.

Yours sincerely,

R. Bock (GSI)
W. Geist (LBL)
H.H. Gutbrod (GSI)
L. Kluberg (Ec.Poly.Palaiseau)
F. Pühlhofer (U. Marburg)
R. Santo (U. Münster)
N. Schmitz (MPI München)
H.J. Specht (U. Heidelberg)
R. Stock (U. Frankfurt)

- **strong support from German community (GSI, Frankfurt, Heidelberg, Marburg, Munich, Münster) towards extending the heavy-ion SPS program at CERN with ion beams as heavy as lead:**
  "… physics arguments in favour of heavy nuclear projectiles as part of a long-term CERN nuclear beam program."

1995: Pb beam at CERN and ALICE TDR

CERN / LHCC / 95–71
LHCC / P3
15 December 1995

ALICE

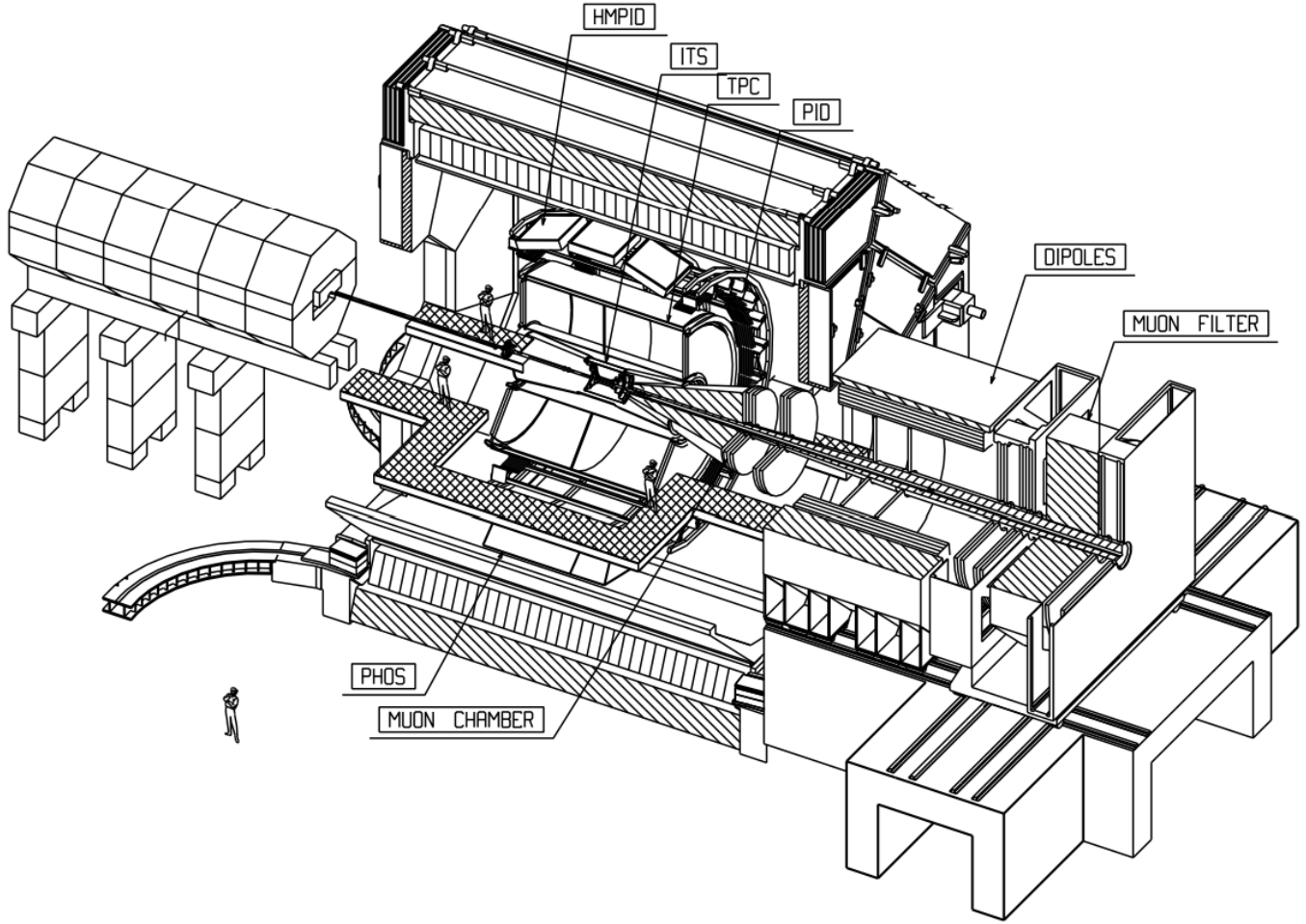
Technical Proposal

for

A Large Ion Collider Experiment

at the

CERN LHC



1996: from Stony Brook to Germany

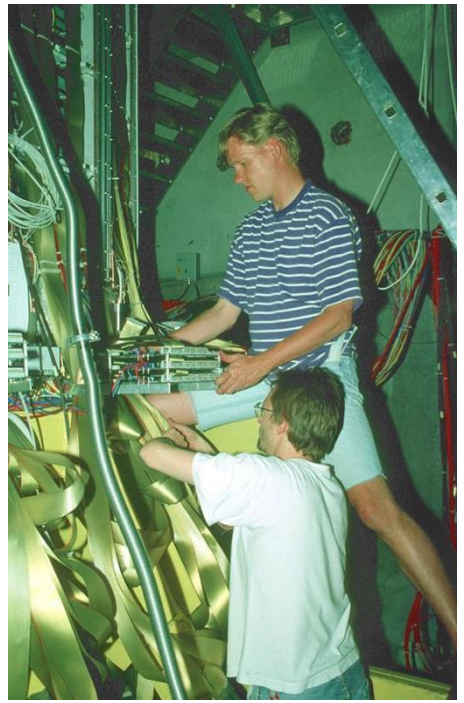




- Peter and Johanna moved to Darmstadt and Heidelberg
- took these two promising young physicists along:







1996: first ALICE meeting at GSI

Subject: working group
Date: Thu, 13 Jun 1996 15:53:16 +0200
From: P.Braun-Munzinger <P.Braun-Munzinger@clri6a.gsi.de>
To: Bokemeyer, Helmut <H.Bokemeyer@clri6a.gsi.de>, Drees, Axel <drees@ceres1.physi.uni-heidelberg.de>, Eschke, Juergen <J.Eschke@clri6a.gsi.de>, Holtzmann, Romain <r.holtzmann@clri6a.gsi.de>, Hong, Byungsik <B.Hong@clri6a.gsi.de>, Irmscher, Detlef <detlef.irmscher@cern.ch>, Johanna Stachel <stachel@ceres1.physi.uni-heidelberg.de>, Koenig, Wolfgang <w.koenig@clri6a.gsi.de>, Leifels, Yvonne <Y.Leifels@clri6a.gsi.de>, Miskowiec, Dariusz <misko@clri6a.gsi.de>, Norbert Herrmann <N.Herrmann@clri6a.gsi.de>, Pinkenburg, Chris <C.Pinkenburg@clri6a.gsi.de>, Reisdorf, Willy <W.Reisdorf@clri6a.gsi.de>, Ritman, Jim <J.Ritman@clri6a.gsi.de>, Roehrich, Dieter <roehrich@ikf.uni-frankfurt.de>, Schmidt, Hans-R. <H.R.Schmidt@clri6a.gsi.de>, Schoen, Heike <H.Neumann@clri6a.gsi.de>, Schoen, W. <W.Schoen@clri6a.gsi.de>, Simon, Reinhard <r.simon@clri6a.gsi.de>, Stroebel, Herbert <stroebele@ikf.uni-frankfurt.de>, Ullrich, Thomas <ullrich@ceres1.physi.uni-heidelberg.de>, Wessels, Hannes <wessels@ceres1.physi.uni-heidelberg.de>

Dear colleague,
as announced previously, we would like to start a working group on physics with the ALICE detector. Keeping in mind that physics with ALICE will start in the year 2005, it is obvious that very few people in the working group will focus exclusively on the subject. Clearly, engagements even on the 20% level are not easy for people presently involved in building or running large experiments. Nevertheless, work has to start now or else the ALICE detector will be defined before we have had a chance to discuss about physics priorities. The first focus for the working group should be the evaluation of the physics potential with electrons in the central ALICE detector. The first meeting will take place on:

==========

Date: Thursday, June 20, 1996
Time: 16:45
Place: Hörsaal Südbau, III. Stock, GSI

Agenda:
- Introduction — pbm
- Some Physics and Detector Considerations — pbm
- Discussion
- Formation of Subgroups/Distribution of Tasks

==========

For those wishing to get more information before the meeting …



Courtesy Dariusz Miskowiec

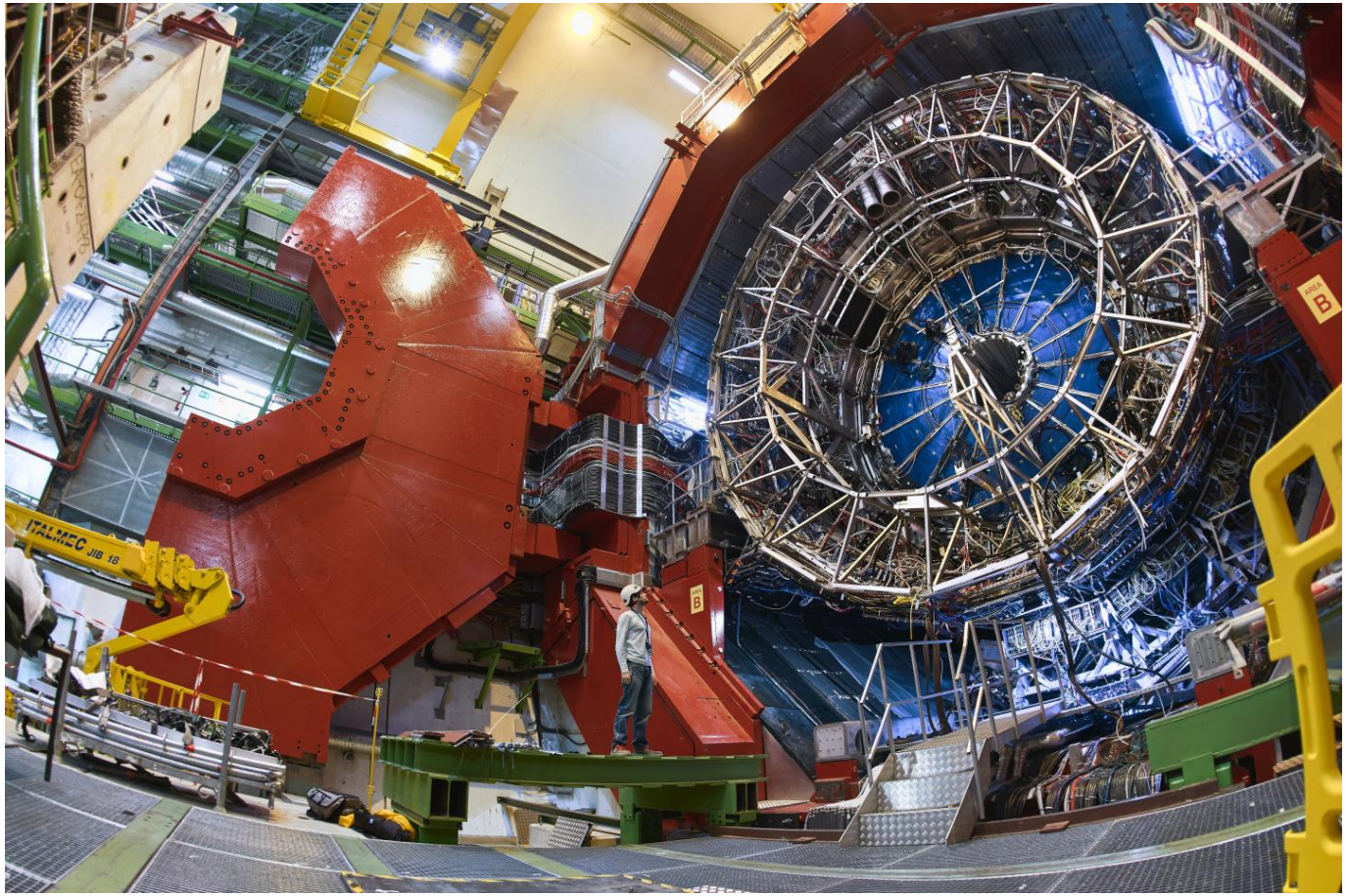
ALICE 1

- at GSI, the ALICE group, together with the Detector Laboratory and the Scientific IT division contributed in a crucial way to

Time Projection Chamber

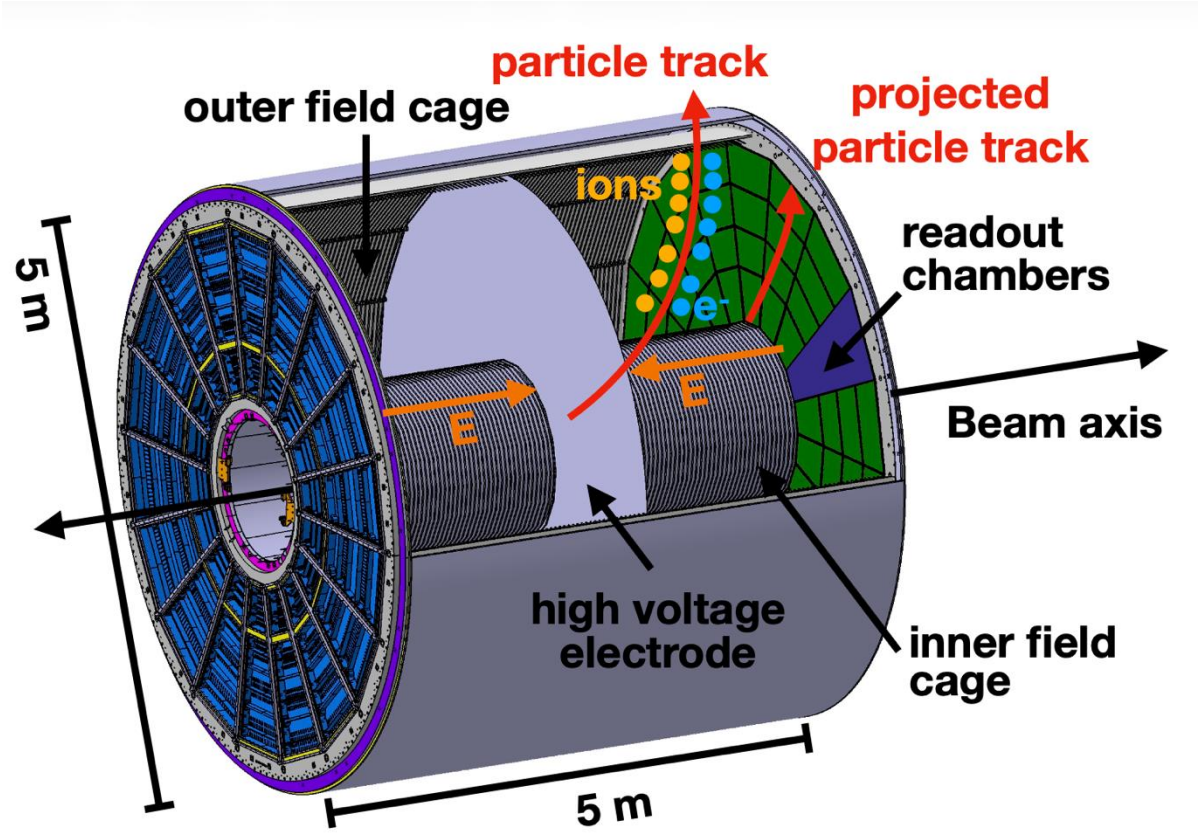
Transition Radiation Detector

High Level Trigger



https://cds.cern.ch/record/2653650

The ALICE Time Projection Chamber





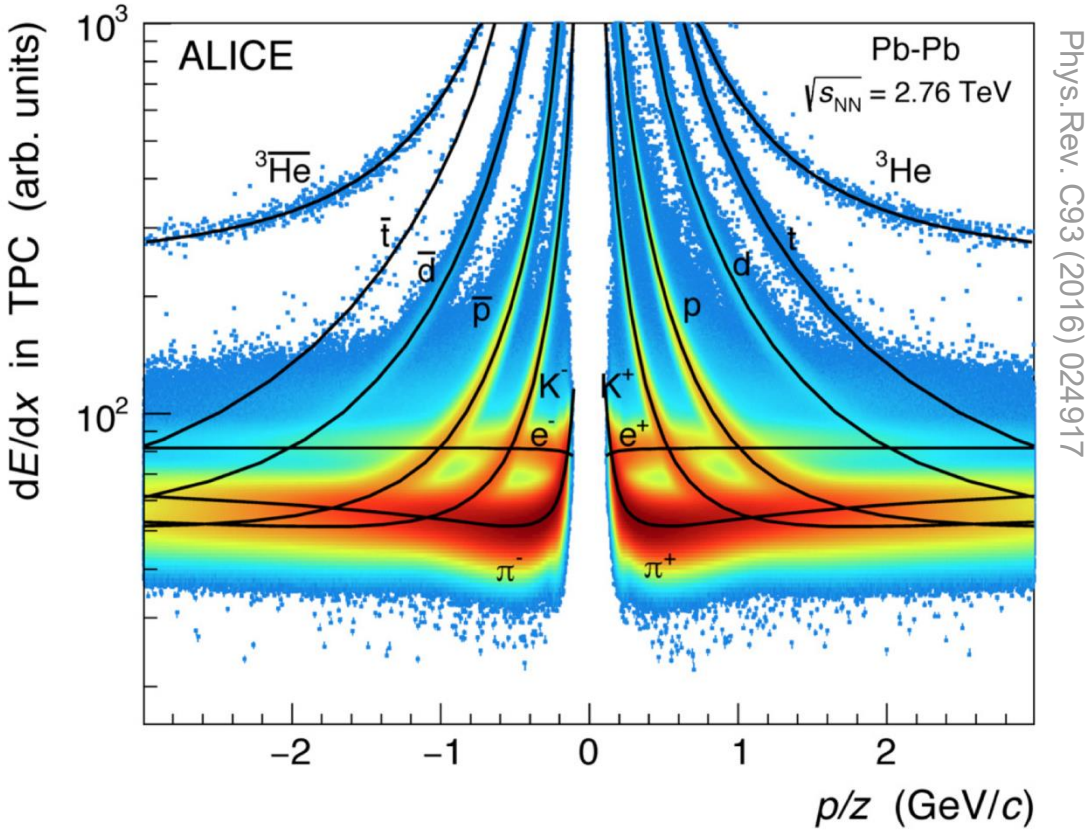
- chamber builders relaxing

- house-warming party



The ALICE Time Projection Chamber

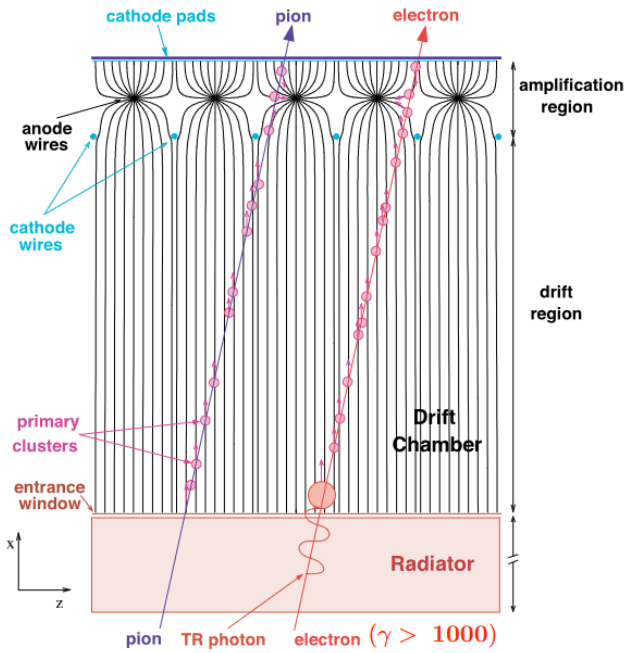


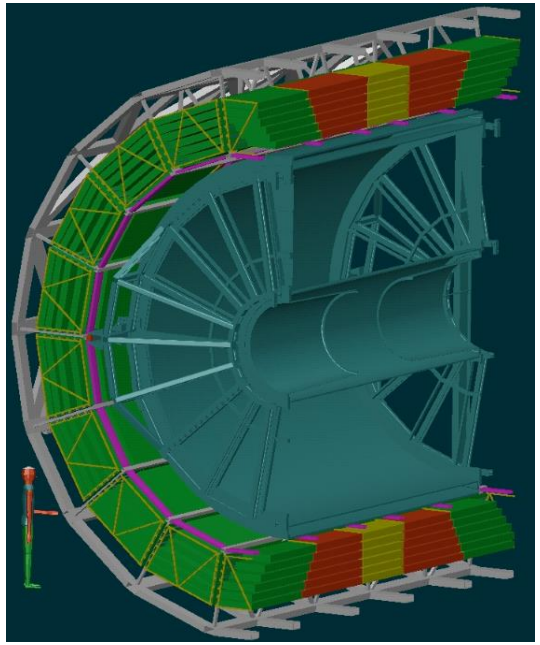


Phys.Rev. C93 (2016) 024917

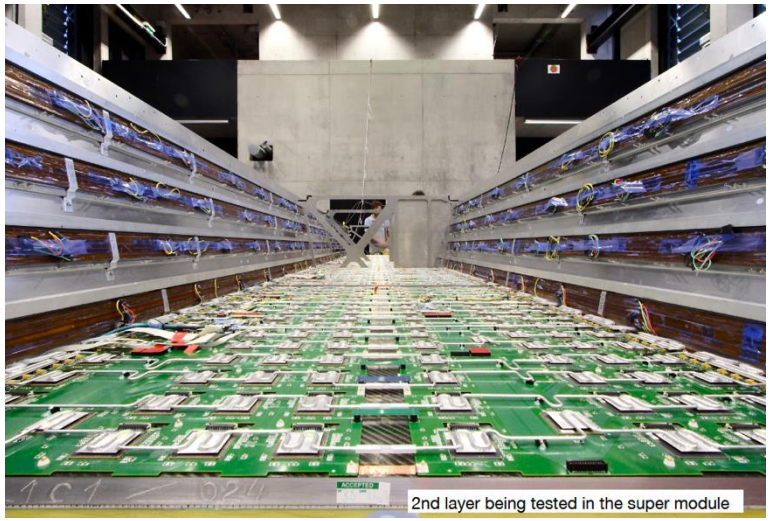
- **ALICE TPC as corner stone of physics analyses:**
  - **tracking**
  - **particle identification**

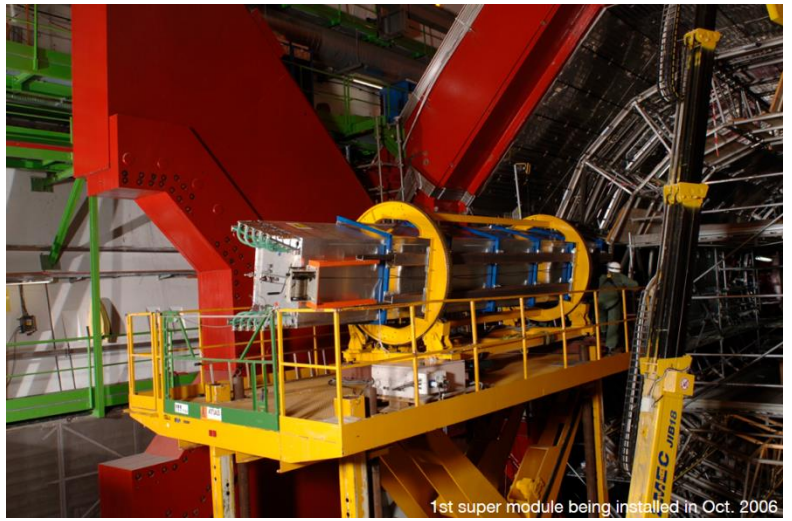
The ALICE Transition Radiation Detector





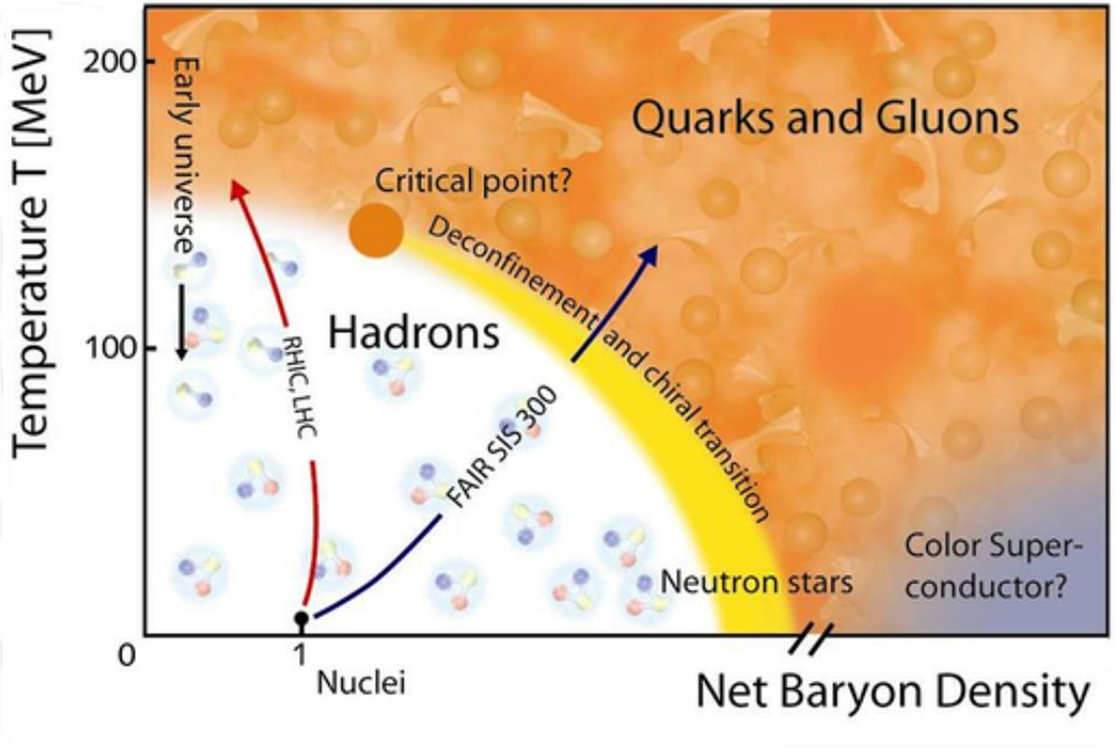






2011: a phase transition for the group

- not this one …



- but this one …



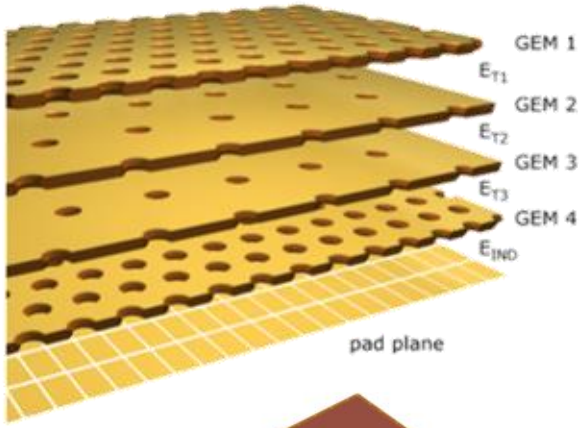


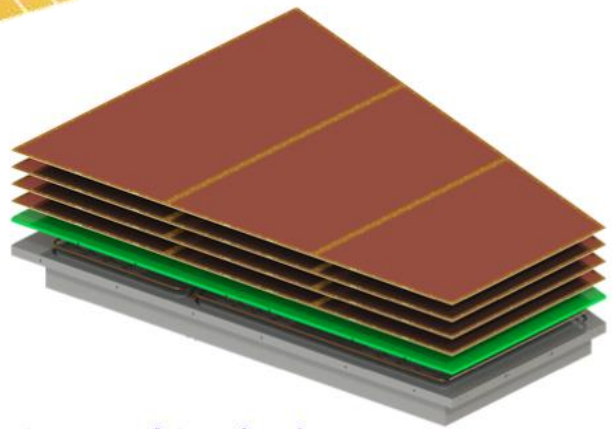


- from Peter to Silvia at the helm of ALICE @ GSI

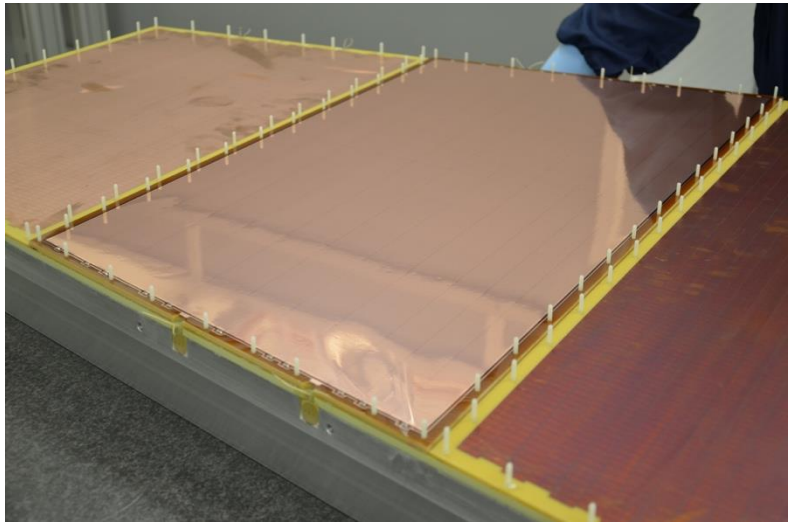
Towards Run 3: TPC upgrade

- LHC promise for Run 3 (2021): Pb-Pb collisions at 50 kHz!
- upgrade from gated readout (up to ~3-5 kHz) to continuous readout using chambers equipped with Gas Electron Multiplier foils





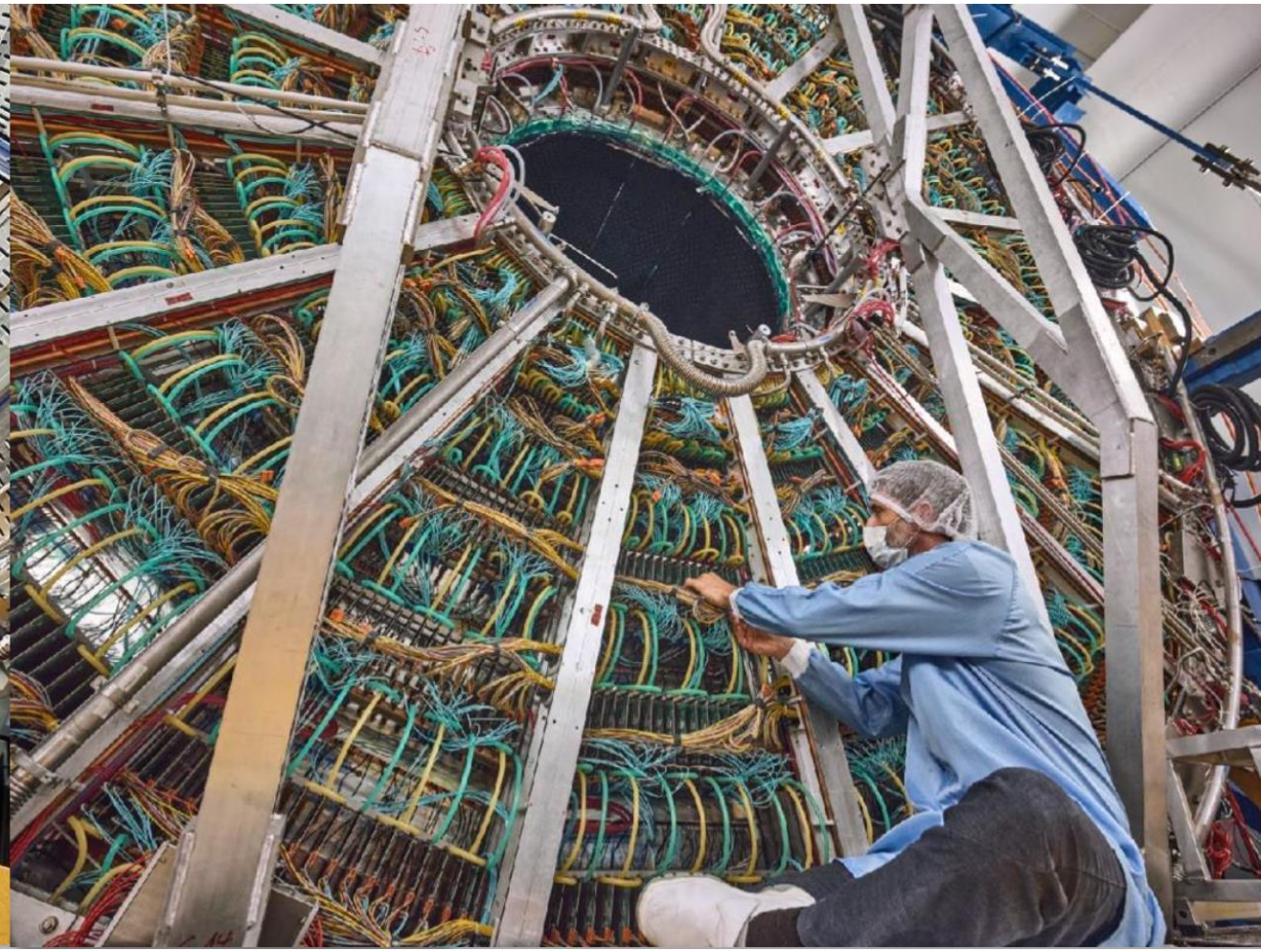






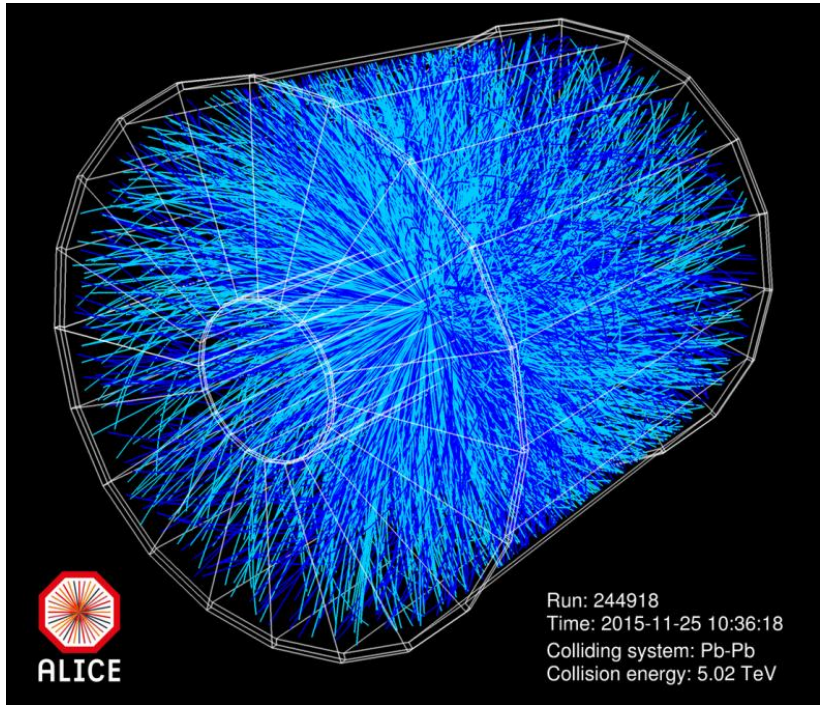
2020: GEM-based TPC for ALICE 2



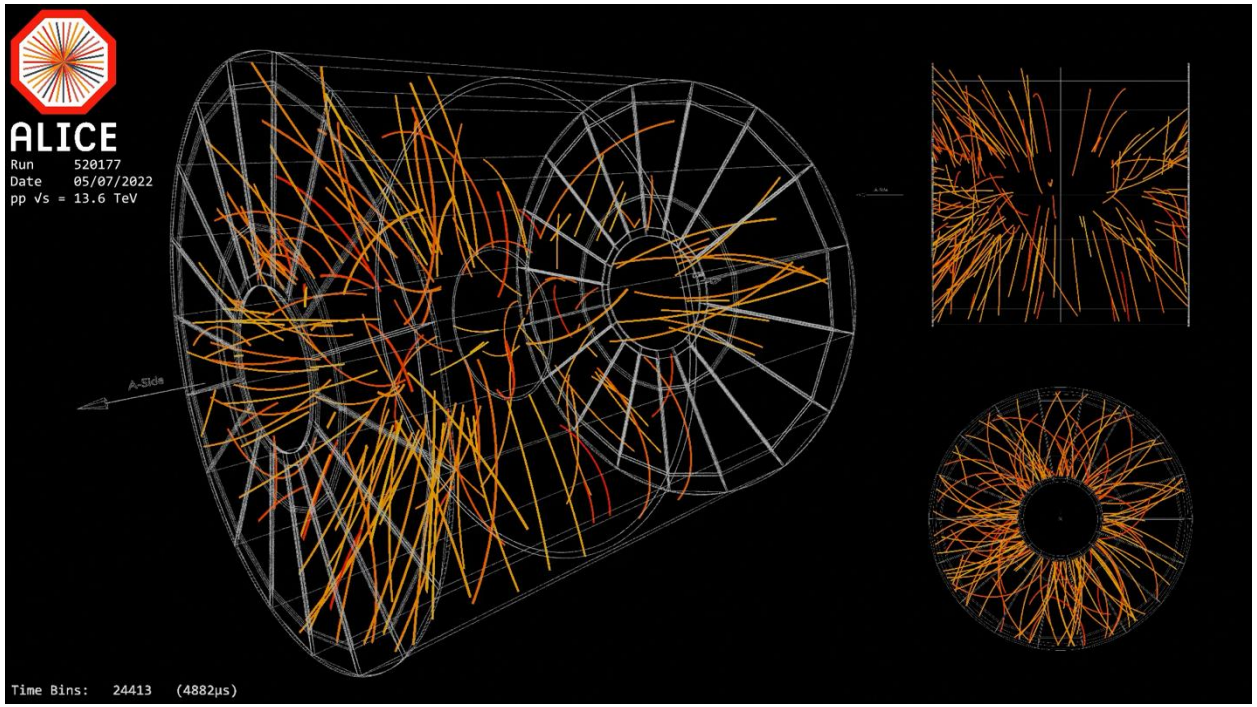


From single collisions to continuous readout

Run 2: gated readout



Run 3: continuous readout



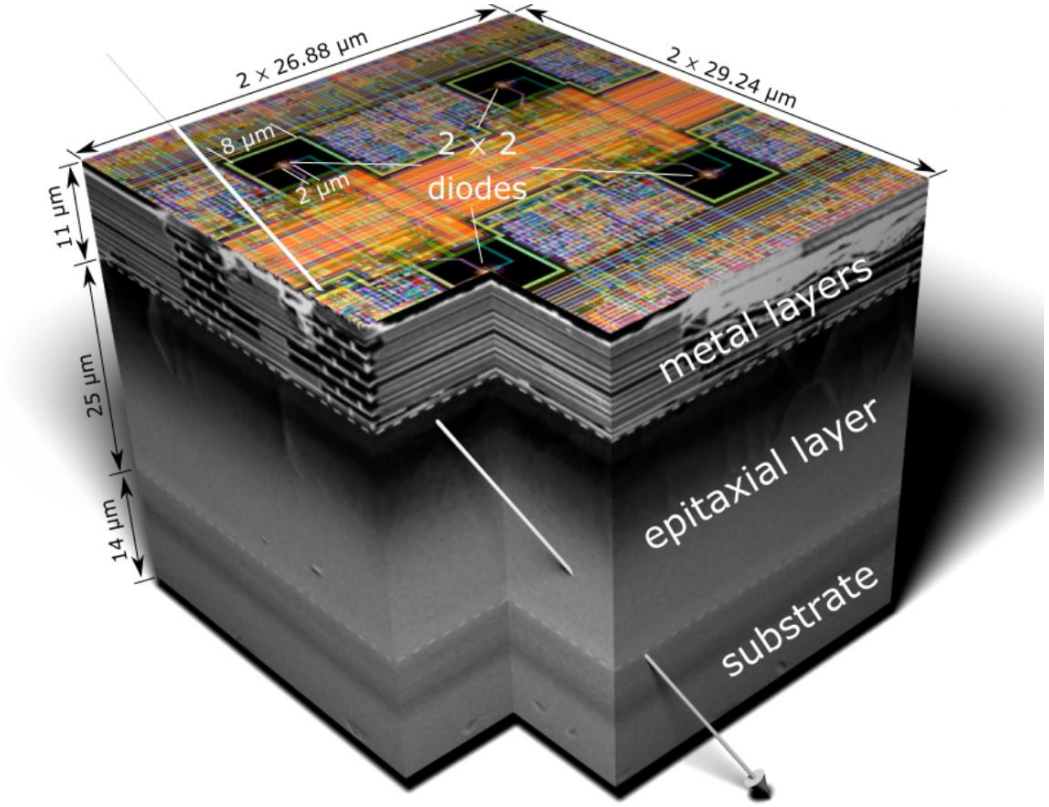
Maurice Donner, MSc Hd

- up to 50 kHz (1 MHz) in Pb-Pb (pp) collisions
- data rates:
  - ~3.5 TB/s from detector
  - ~200 GB/s to disk (after online reconstruction)

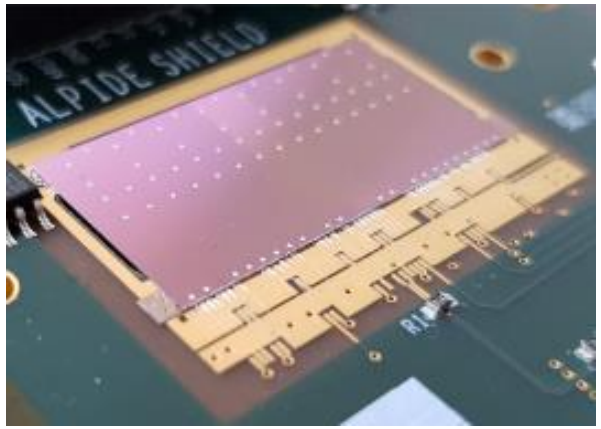
- increase in collision statistics
  - Pb-Pb: Run 3 > 100 x Runs 1+2
  - pp: Run 3 > 1000 x Runs 1+2

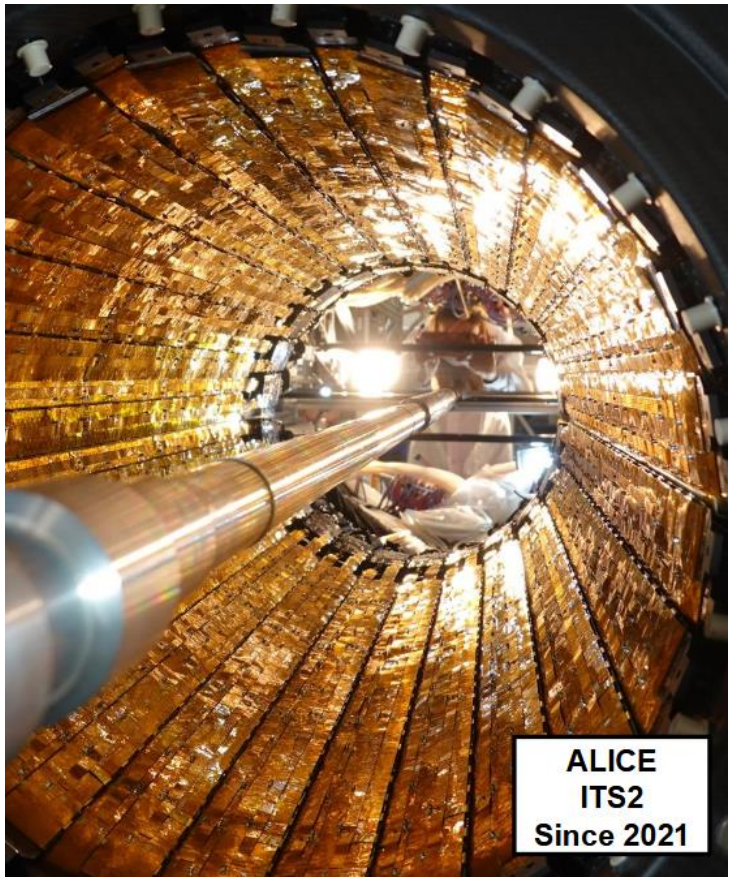
And there is more: GSI went MAPS

- active topic of R&D since 2019 in ALICE@GSI (introduced by Silvia): CMOS Monolithic Active Pixel Sensors (MAPS)



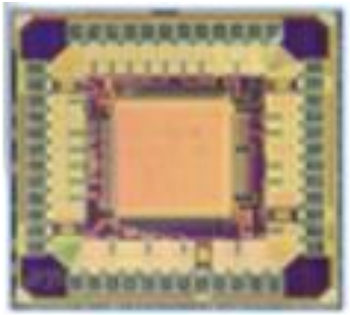
- a real-world example: ALPIDE
  - 180 nm feature size
  - 24k ALPIDEs at work in ALICE ITS2

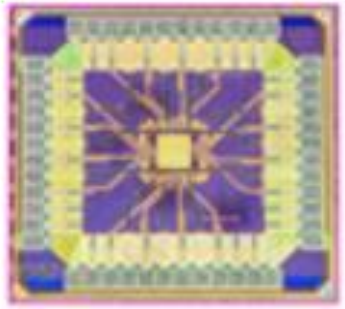




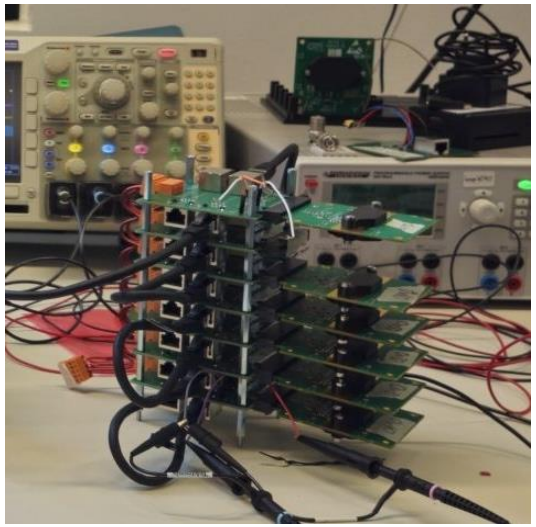
Activities towards next generation MAPS

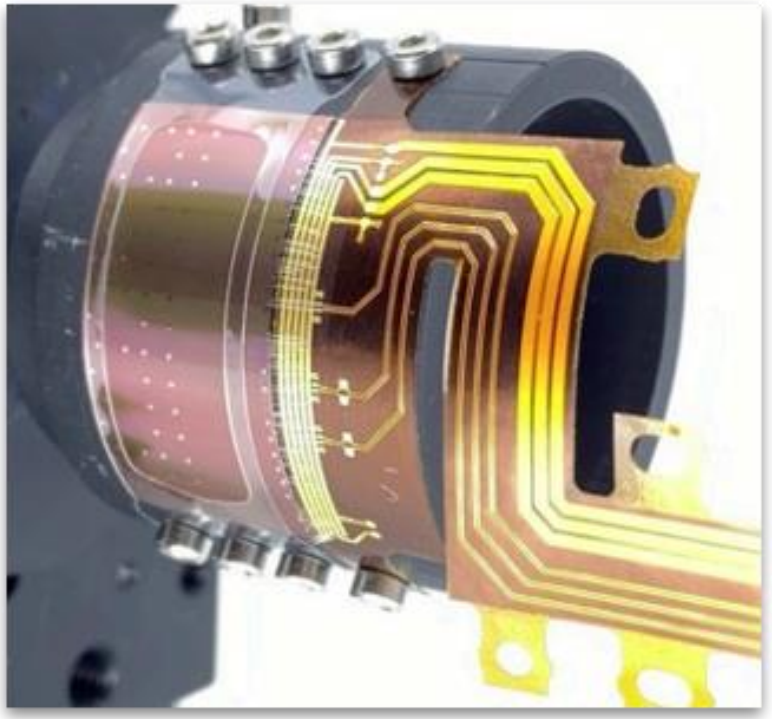
- from flat to cylindrical sensors: performance validation with test beams
- smaller structures (65 nm): characterization of digital and analog test devices

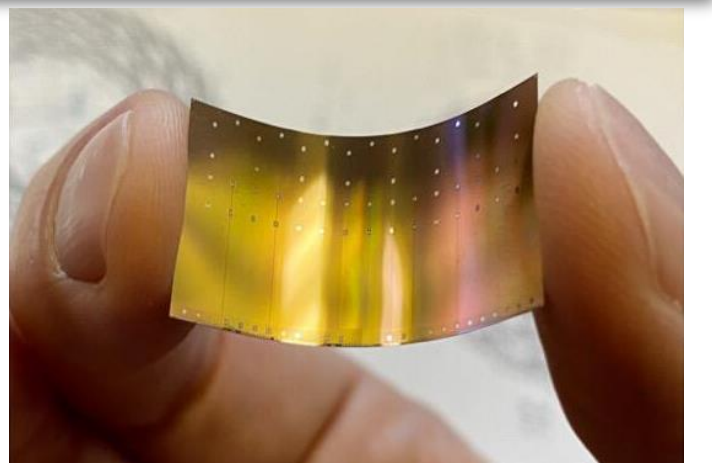




- investigation of serial (and other) powering schemes

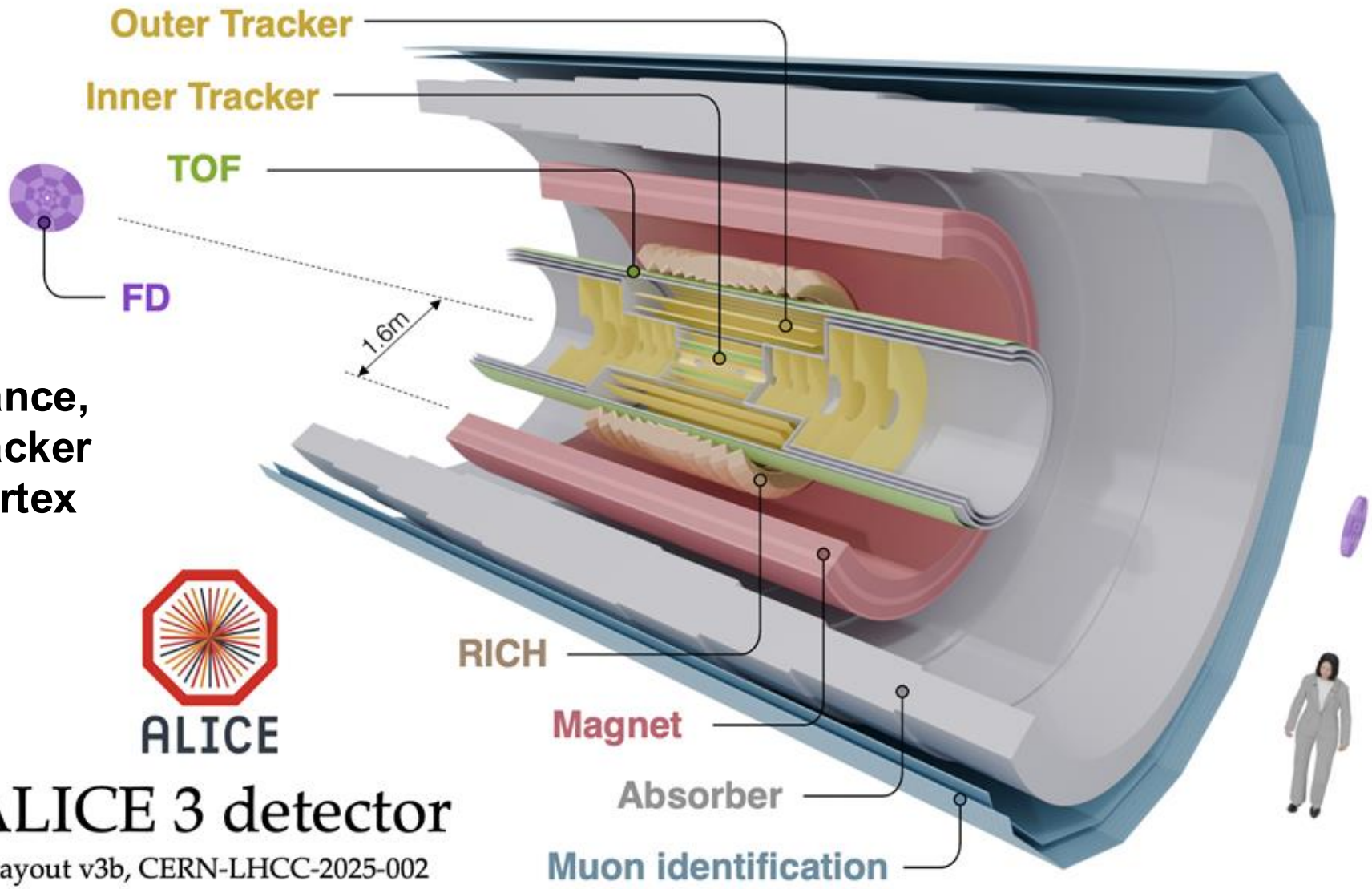






Looking ahead: ALICE 3

- "ultimate" detector for research on strongly-interacting matter at the LHC (start of operation in 2036)
  - compact, large acceptance, ultra-light all-silicon tracker with high-resolution vertex detector and excellent particle identification
- GSI focus
  - ~40 m² MAPS-based Outer Tracker



Key element: people!

- “young” colleagues come, stay with us, and leave very happy and satisfied with their experience and success in the group!







PS:
they also find “good jobs”

examples from mountain retreats (2014 – 2016)

supported generously by the WILHELM UND ELSE HERAEUS-STIFTUNG

Taking care of people: Chinese New Year

- since 2018: special programs for junior scientists from China to work at GSI
  - typical start of the programs: beginning of the year → not at home for Chinese New Year …
  - that was fixed!







