MPGD 2024 – Closing Remarks

The 8th International Conference on Micro-Pattern Gaseous Detectors

Oct.14th - Oct.18th 2024 USTC·Hefei, China

Eraldo Oliveri, CERN

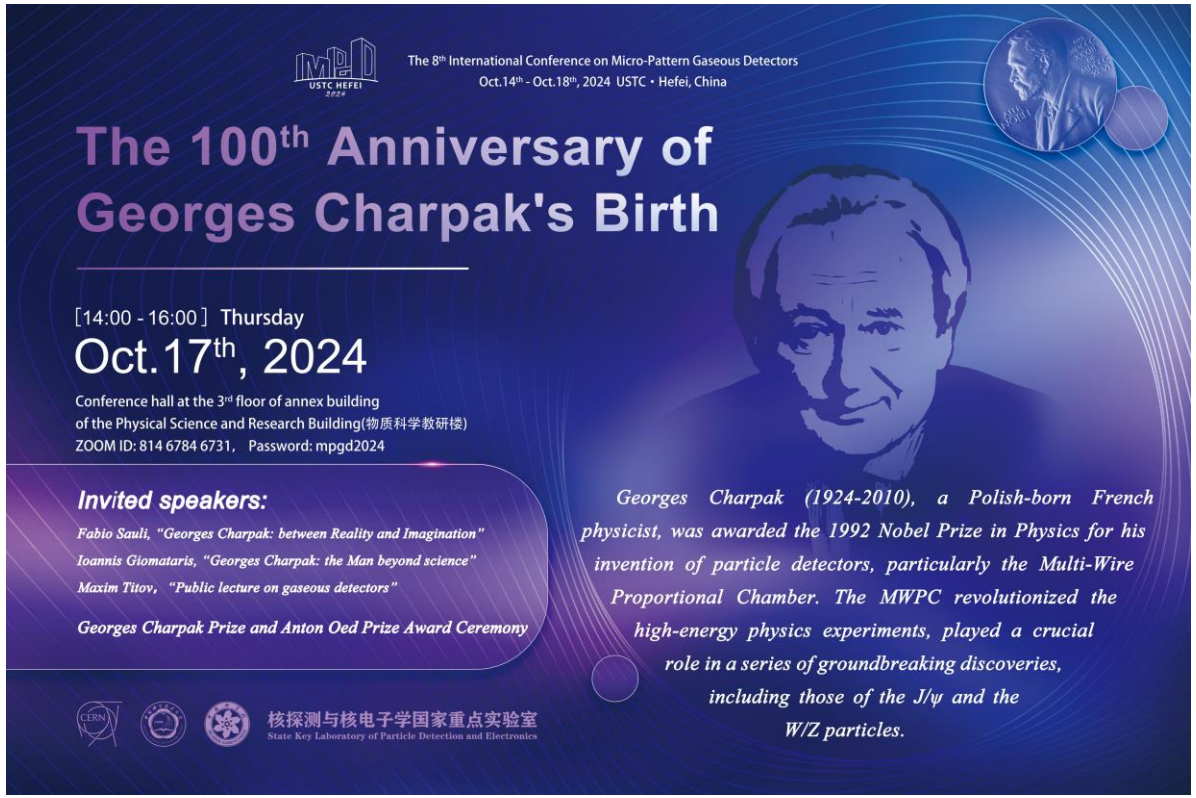
Conference aim and covered topics

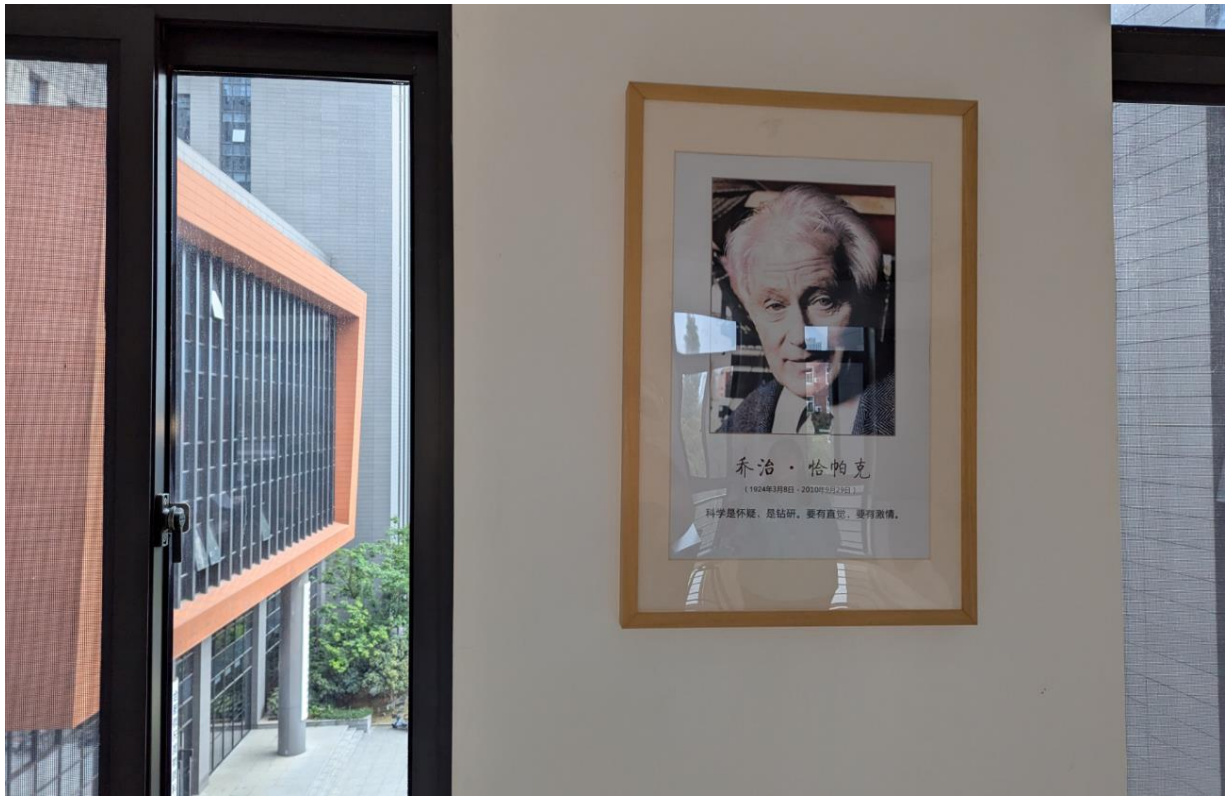
Bring together the MPGD communities from around the world to review the status and progress of worldwide MPGD research and development, discuss new results and developments in the MPGD-related fields and look toward future prospects for MPGD development and application.

- MPGD technologies
- Detector physics
- Detector performance
- Simulation and software
- Applications
- Electronics
- Production techniques
- Future perspectives

The 100th Anniversary of Georges Charpak's Birth

Thursday 17/10





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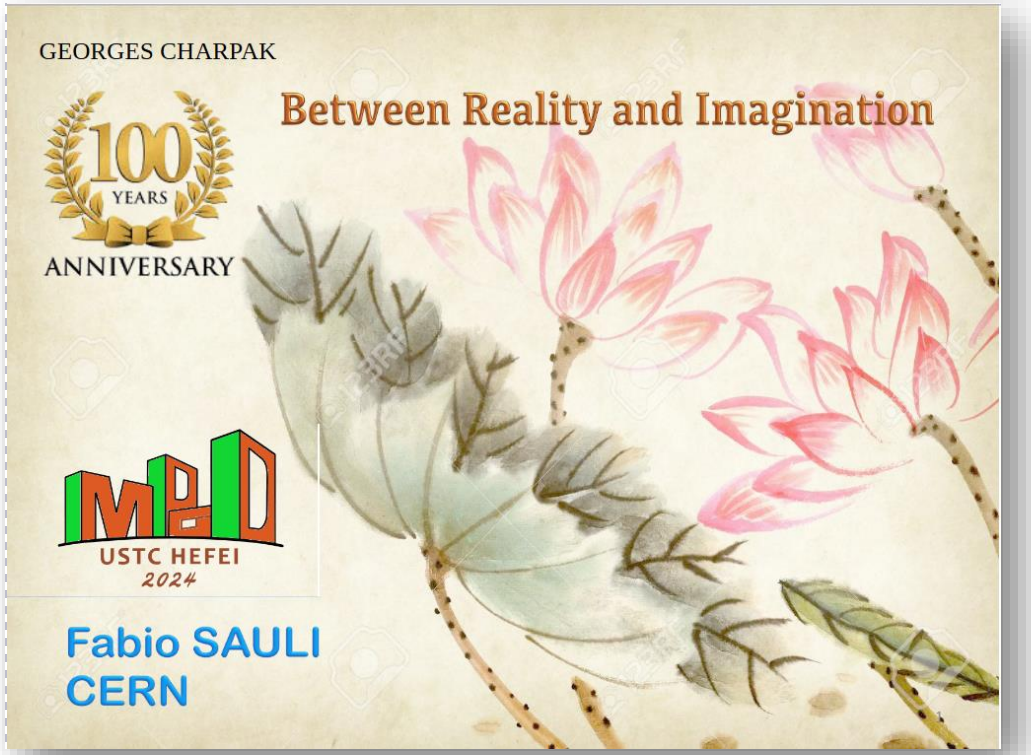
The 100th Anniversary of Georges Charpak's Birth

Fabio Sauli,



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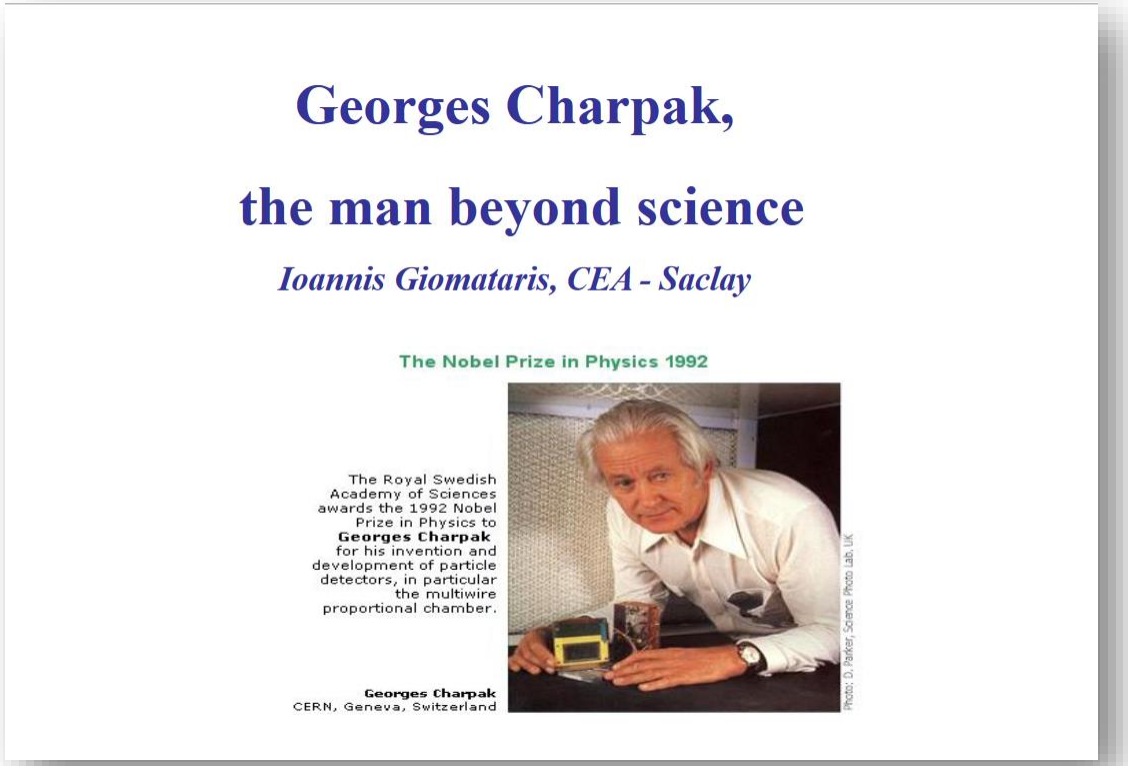
Ioannis Giomataris



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+ Maxim Titov, Public lecture on gaseous detectors

MPGD2024 Charpak's Prizes

Poster: **15 Colleagues Eligible (<35y) over 24 (about 62%)**

Oral: **31 Colleagues Eligible (<35y) over 55 (about 56%)**

We would like to congratulate all the young colleagues on the high quality of the presented work

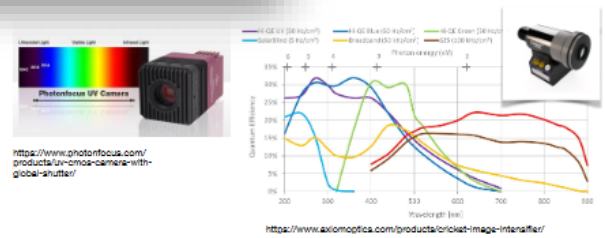
MPGD2024 Charpak's Prizes

Wavelength shifters for optically read out MPGDs

ORAL

adout

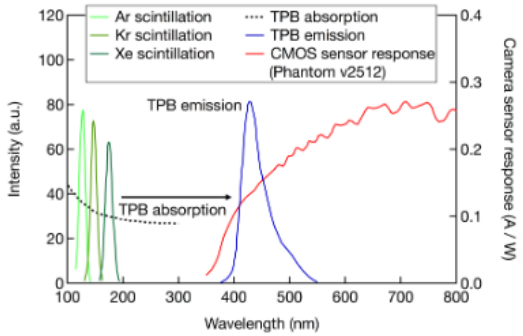
…ras / converters … / sensitivity



Specialised image sensors for **UV sensitivity** may be used to directly record scintillation from gas mixtures or pure gases.

Alternatively, converters such as image intensifiers with **UV-sensitive photocathodes** and VIS re-emission may be used to record UV light with visible-sensitive imaging sensors.

Using wavelength shifters (WLS)



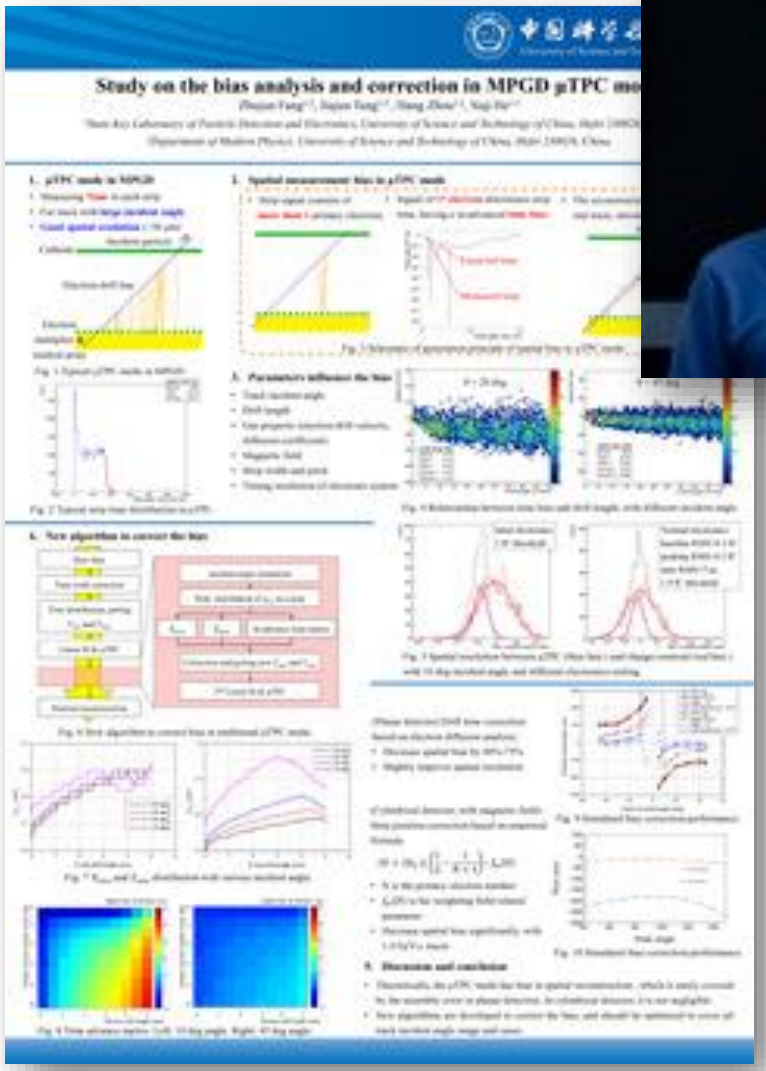
Data from: Ignarra, O.M. Physics Procedia 37 (2012): 1217–1222.
Scintillation data from: V. M. Gehman et al. NIM A 654 (2011) 1.

Wavelength shifters such as tetraphenyl butadiene (**TPB**) can be used to shift scintillation light spectrum to the visible wavelength range with a peak around **425 nm.**

6

Florian Maximilian Brunbauer

Study on the bias analysis and correction in MPGD μTPC mode



POSTER

Zhujun Fang

Anton Oed Prize Award

2024 Oed Prize Award

Presented to

Leszek Ropelewski

for outstanding achievement in the development of Micro-Pattern Gaseous Detectors

Honoring Atsuhiko Ochi: A Tribute Session

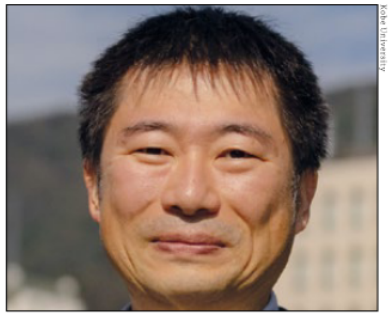
Tuesday 15/10

ATSUHIKO OCHI 1969–2024

Brilliance in detectors

Atsuhiko Ochi, a brilliant, passionate detector and experimental physicist, passed away on 29 April 2024 at the untimely age of 54. A source of innovative ideas at the forefront of radiation detectors, he made outstanding contributions to the development of micropattern gaseous detectors (MPGDs) that are recognised worldwide. He was also a distinguished lecturer whose inexhaustible passion, dedication and remarkable character captivated the many students he mentored.

Atsuhiko began his research at the Tokyo Institute of Technology, initially focusing on large-area avalanche photodiodes as fast photon and soft X-ray detectors. In 1998 he defended his PhD thesis "Study of Micro Strip Gas Chamber as a Time-Resolved X-ray Area Detector", earning the second High Energy Physics Young Researcher's Award from the Japan Association of High Energy Physicists. In 2000, alongside Toru Tanimori, he introduced the micro pixel chamber (micro-PIC), a new gaseous detector for X-ray, gamma-ray and charged-particle imaging. It was fully developed using printed circuit board technology and free of floating structures like wires, mesh or foils, featuring a pin-shaped anode surrounded by a ring-shaped cathode.



Kobe University

Atsuhiko Ochi made significant contributions to MPGD and other gaseous detectors.

In 2001 Atsuhiko moved to Kobe University, where he joined the ATLAS experiment and devoted his efforts to commissioning the ATLAS thin gap chambers (TGCs). He was also in charge of integrating the front-end electronics on the KEK TGC detectors and of detector quality assurance and control. Later, at CERN, he led the acceptance quality control of the ATLAS TGCs.

Atsuhiko could always merge his love for experiments with a passion for new ideas. "We need new 'eyes' to catch a glimpse of science's frontier", he once said. Along with his group in Kobe, while making significant contributions in ATLAS to the design and construction of the new large resistive micromegas for the Muon New Small Wheel, he conducted R&D on the use of sputtered layers of diamond-like carbon (DLC) as resistive elements to quench discharges and played a crucial role in connecting with Japanese industry. He was among the first to test the technology with micromegas, apply it to the micro-PIC detector, and pioneer its use as electrodes for the novel resistive plate chambers he proposed for the MEG II experiment. He supported the use of DLC in the final TPC micromegas of the near detectors of the T2K experiment while serving as a liaison person with BE-Sput in Kyoto. DLC is now the predominant approach in most new resistive MPGD detectors.

In his research, Atsuhiko always placed great emphasis on mentoring students and giving them access to a worldwide community of experts, facilities and experiments. He meticulously shared all relevant research conducted by Japanese colleagues, ensuring proper visibility and recognition for his community. This has been crucial in the international RD51 collaboration on MPGD technologies, within which he played a significant role in its formation and management. During the transition from the MPGD-based RD51 collaboration to the upcoming DRD1, which encompasses a broader scope of technologies and applications, Atsuhiko made a crucial contribution by maintaining strong ties with the Asian community.

Atsuhiko's vibrant enthusiasm and infectious smile leave an irreplaceable void. His departure is a profound loss, leaving behind a loving wife and two children.

His colleagues and friends.

https://indico.cern.ch/event/1453371/sessions/570555/#20241015

MPGD2024 – Scientific Programme

Invited Talks

- EIC and ePIC Detector, Silvia Dalla Torre, INFN, Trieste
- Optical readout of MPGDs: applications and R&D, Florian Maximilian Brunbauer, CERN
- Future Colliders for High Energy Physics in China (CEPC & STCF), Jianbei Liu, University of Science and Technology of China
- Progress of Experiments in China's Underground Laboratories, Yue Meng, Shanghai Jiao Tong University
- China spallation neutron source and neutron detectors, Zhijia Sun, Institute of High Energy Physics, Chinese Academy of Sciences
- Quantum Information: From Test of Quantum Foundations to New Quantum Technologies, Yuao Chen, University of Science and Technology of China

MPGD Technologies (μRWELL & μRGroove)

The micro-RWELL for future HEP challenges and beyond, Matteo Giovannetti

R&D efforts on increasing detector stability and establish simple production processes (LHCb high-rate PEP-DOT, FCC/IDEA GEM-uRWELL, C-Well, TT ELTOS-CERN, Thermal Neutron Detection sRPC).

μ-RWELL muon system and pre-shower for FCC-ee, **Riccardo Farinelli**

Performance optimization for 2D readout large-area (50x50 cm tiles) μRWELL (pre-shower and muon systems in the IDEA detector), focusing on DLC resistivity, strip pitch, and various 2D readout configurations. Readout via TIGER compared with APV25. Parametrization of the μRWELL signal is ongoing, showing good agreement with APV25 data.

A cylindrical μRGroove detector for the super tau-charm facility, Siqi He

The first C-μRGroove prototype has been completed and tested. Beam data in magnetic field successfully taken. Analysis ongoing together with the development of the μTPC algorithm. A new μRGroove with thicker APICAL (75μm) has been produced and will be tested to evaluate its performance compared to the standard 50μm.

MPGD Technologies (Micromegas)

Study on the long-term stability of thermal bonding Micromegas detectors for high gas pressure experiments, Yunzhi Peng

The improved thermal-bonding Micromegas, featuring a Germanium (Ge) film-based resistive anode, enhanced gain uniformity (particularly at the edges), and glue instead of hot melt adhesive, enables stable operation at pressures up to 10 bar.

Resistive High Granularity Micromegas for Future Detectors. Status and Perspectives, Mauro Iodice

Comparative analysis of results obtained with two different resistive layouts (pad-patterned and double-layer DLC) emphasizing their response under high irradiation and high-rate exposure. The first large-area double-layer DLC module (50x40 cm^2) has been produced and tested, with promising results in particular on the capacitive sharing technique.

MPGD Technologies (MPGD/pixel hybrid)

Towards MPGDs with embedded pixel ASICs, Lucian Scharenberg

Integration of MPGD and the new Timepix v4 ongoing profiting of the Timepix V4 Through Silicon Via. Successfully tested with Triple GEM, next key milestone is the embedding of uRWELL. Future goals & dreams: investigate other FE ASIC and explore the possibility of making a full-wafer-size silicon readout board.

MPGD Technologies (Gas)

GEM operation in Nitrogen based gas mixtures: opening new applications for X-Rays, UV-light and neutron detection with the use of environmental-friendly mixtures, Gabriele Croci

This study explores the operation of GEM devices with gas mixtures containing Ar and/or N2. N2, suitable for recirculating systems in sealed detectors, has a high thermal neutron cross section and emits photons mainly above 250 nm. These properties enable the development of sealed X-ray GEM detectors, low-mass neutron beam monitors, and GEM photon amplifiers.

Beyond standard MPGD Technologies

Development of the high-rate capable DLC-RPC based on the current evacuation pattern, **Masato Takahashi**

DLC-RPC for background suppression in MEG II. A new electrode with a new current evacuation pattern has met the single-layer efficiency requirements . Instabilities during long-term operation are under investigation. Production of a 4-layer DLC-RPC, with a ϕ 16 cm active region and segmented HV supply, is planned for March 2025.

Nano-pattern gaseous detector (NPGD), Yalçın Kalkan

A GEM-like element based on Anodic Aluminum Oxide (AAO) nanotubes has been produced. The device will be tested to characterize its performances as a potential amplification stage.

Application (Tracking & muons)

GEM Detectors for the CMS Endcap Muon System: status of three detector stations, Yanwen Hong

GE1/1 has been in operation since Run 3 (2022), with electronics refurbishment planned during LS3. GE2/1 has been postponed until after LS3 to prioritize ME0, whose production has already started.

ATLAS Micromegas Performance Studies with LHC Run3 Data, Simone Francescato

MM detectors are fully included in the online DAQ and offline software since the start of 2022 and actively contributing to ATLAS Run3 analyses. MM Trigger operational in 2024. Tracking efficiency is at the level of 95% for MM. Optimization ongoing to improve resolutions (now at 200-700μm)

Commissioning of the CGEM Inner Tracker, Giulio Mezzadri

The CGEM tracker consists of three coaxial layers of triple GEM. The readout system is based on the TIGER ASIC. A cosmic ray data collection campaign has been done to evaluate the performance of the CGEM prior to installation. This includes full cosmic ray characterization and the first implementation of the μTPC algorithm on a cylindrical GEM. The CGEM is being installed and connected in these days.

Application (Tracking & muons)

Development of a new large area Micromegas detector and its ToRA-based readout electronics for AMBER experiment at CERN, Maxim Alekseev

COMPASS MWPCs will be replaced with micromegas modules (1x0.5 m²), featuring two readout planes in a face-to-face configuration and a common cathode. A single DLC layout is used for the lateral module, while a double DLC layout is used for the central module. Production of the first module has been completed, and the first test with TIGER-based front-end electronics is ongoing. A new ASIC, ToRA (Torino Readout for AMBER), is also being developed with new interesting possibilities..

Development and experimental study of the high spatial resolution muography system with Micromegas detectors, Yu Wang

A series of muon imaging telescopes utilizing Micromegas detectors based on the thermal bonding technique and scalable readout systems have been developed. A channel-encoded multiplexing method has been created to reduce the number of electronic channels by an order of magnitude. Using these muon imaging facilities, experiments in both muon scattering imaging and transmission imaging have been conducted.

A novel technology for element-sensitive 3D tomography, Xiao Zhao

Twin GEM TPC tracking is employed for the Muon Induced X-Ray Emission (MIXE) experiment. The system has achieved millimeter-scale spatial resolution and demonstrated depth sensitivity to various materials. Tests with He/CO_2 have been conducted to reduce scattering. A new detector with pad or pixelated readout is being considered, along with advancements in machine learning and algorithms to enhance tracking capabilities.

Applications (Calorimetry)

Performance of resistive MPGD for hadron calorimeter, Anna Stamerra

Developments of MPGD-HCAL are ongoing. Simulation is showing good Beam Induced Background (BIB) rejection for the muon collider. Tests on prototypes confirm Monte Carlo simulations and guide future steps such as R/O cross-talk removal and energy resolution optimization to make the semi-digital readout sufficient for particle flow. A common project with Crilin (ECAL for MuCol) has also started.

Comparative study of resistive MPGD technologies, **Darina Zavazieva**

Comparison (in laboratory and test beam) between MM, uRWELL, and RPWELL as sampling elements for digital hadronic calorimeters. VMM3a as common readout FE electronics. Efficiency plateau is reached with all technologies. Gain and cluster size are consistent with the design; further investigation required for instabilities observed in RPWELL.

Applications (Timing)

PICOSEC Micromegas precise-timing detectors towards large-scale applications and optimization, Yue Meng

An optimized single-channel detector achieved a time resolution better than 15 ps with MM and better than 25 ps with uRWELL (CsI PC). Alternative mixtures to Ne/CF4/C2H6 tested, resolution of less than 20 ps obtained with a Ne/iC_4H_{10}. A new high-rate resistive detector (10x10 cm², bulk mm, double-DLC resistive layer) and a new large-area detector (20x20 cm², thermal bonded mm, germanium resistive layer) have been built and tested. Various readout electronics options successfully tested.

Robust photocathodes and spatial resolution studies of resistive PICOSEC Micromegas precise-timing detectors, Djunes Janssens

Resistive mm: 20 MΩ/sq single channel resistive Micromegas has been confirmed to be equivalent to the non-resistive version. The 10x10 cm² high-rate resistive detectors achieve better than 20 ps, but optimization is required for uniformity Spatial Resolution Studies: a prototype with high readout granularity has been tested, enabling sub-mm resolution. Photocathodes: less than 35 ps has been achieved with DLC and B4C photocathodes. Preliminary but interesting results were obtained using titanium as a photocathode.

Applications (TPC & Tracking)

Recent results on the low-pressure GEM-based TPC at an Accelerator Mass Spectrometer, Tamara Shakirova

A low-pressure TPC with GEM has been developed and successfully tested for BINP AMS. The ion identification technique is based on measuring both ion track ranges and ion energies, allowing effective separation of isobaric boron and beryllium ions at BINP AMS.

The Ultra-Low material budget GEM based TPC for tracking with VMM3a readout, Francisco Garcia Fuentes

The HGB4-2 Twin GEM TPC has been tested at the CERN/SPS. Different gas mixtures of Ar/CO_2 and He/CO_2 were used. During the latest campaigns, scans of the drift fields were performed to quantify the combined effects of drift velocity and diffusion on overall performance. The prototype is now finalized and suitable for mass production for FAIR.

High Spatial Resolution Time Projection Chamber Technology R&D for Future e+e- Collider, Huirong Qi

TPC technology R&D is focused on transitioning from pad readout to pixelated readout for future e^+e^- colliders. The pixelated TPC has been chosen as the baseline gaseous tracker in the CEPC reference TDR. Simulations show good PID performance, momentum resolution, and track reconstruction. Strong synergies with CEPC, FCCee, EIC, and LCTPC.

Technical challenges for the new T2K ND20 High Angle TPCs, Stefano Levorato

Two new TPCs have been just installed in ND280 at JPARC. Stable operations in commissioning and technical runs and first Neutrino Data taking just completed. Resistive MM with encapsulated anode ERAM designed to grant proper resistivity, for optimal charge spread and sparks quenching. New algorithms for square pads exploiting detailed response model under development.

Applications (TPC for DM, Rare events,..)

Experimental comparison of strip micromegas readouts in gaseous TPCs for directional recoil detection, Ghrear Majd

Studies focused on 3D charge reconstruction for the CYGNUS experiment. A comparative analysis of different x/y strip layout readouts using the VMM3a ASIC has been completed to define the design of the 40L detector. The expected directional performance with diffusion suppression will be re-assessed. Outlook: cluster counting via NID or faster electronics. With NID, an improved and optimized amplification stage is required.

MIMAC – 35 x 35 cm2 : 3D-nuclear recoil tracks detection for directional Dark Matter detection and Neutron spectroscopy, Zhiyong Zhang

MIMAC has developed a know-how on 3D nuclear recoil directional detection from 300 eV up to 15 MeV and more (600 MeV). The nuclear recoil directional detection is the observable needed to go beyond the neutrino floor for DM search.The 35 x 35 cm2 will be the elemental brick to build a big volume directional detector

No neutrino Double beta decay Experiment – NvDEx, Chengxin Zhao

High-pressure TPC in the China Jinping Underground Laboratory (CJPL) aiming to search for neutrinoless double beta decay of ^{82}Se. $^{82}SeF_6$ as gas and the Topmetal silicon sensors for readout. The NvDEx concept and its advantages presented together with the progress of the NvDEx-100 (100 kg of SeF_6 gas) detector.

Applications (TPC for γ & x-ray)

New Mission Concept: a high precise MeV Gamma Telescope using TPC Technique read out with Micromegas, Libo Wu

MeGaT aims to open up the MeV γ-ray observation window with very high sensitivity. It features a high-pressure TPC operating at 3–10 bar, with a volume of 100 × 100 × 50 cm^3, using thermal bonded MM and CdZnTe detectors. The system has a high dynamic range (0.3 MeV - 100 MeV) and an angular resolution (PSF) of 2° at MeV and 0.5° at 100 MeV. The first 30 cm cubic prototype is under construction and will be characterized with a photon beam by the end of 2024.

Development and Preliminary Results of a Large-Volume Time Projection Chamber for X-ray Polarimetry, Fiorina Davide

X-ray polarimetry in the range of [10, 60] keV with optically readout TPC (CYGNUS OTPC). Tested at the INAF-IAPS calibration facility in Rome. Testing showed complete reconstruction of photoelectrons in the 10-60 keV range, with angular resolutions down to 15° and energy resolutions between 10% and 15% for the 5-45 keV range. Future tests with ORCA Quest qCMOS, 3D implementation, as well as with different gas mixtures and pressures, are planned.

Applications (Optical Readout and Optical TPC)

The CYGNO experiment, a Gaseous TPC for directional Dark Matter searches, Davide Fiorina

A high-precision triple-GEM TPC with optical readout is designed for the directional direct search of dark matter (DM) WIMP-like particles in the low mass range (0.5-10 GeV). The feasibility is demonstrated by the LIME/50L Single TPC. The CYGNO04/0.4m^3 common-cathode double TPC aims to prove the scalability.

Real time Migdal effect searches with deep learning-based object detection, Jeffrey Schueler

ML algorithms are trained on real data (made of commonly observed topologies) to identify rare events from their constituents. The YOLOv8-based pipeline enables real-time searches at over 120 fps.

PMT analysis for Negative Ion Drift and 3D reconstruction, **David Marques**

Reconstructing ionization events in three dimensions greatly improves spatial resolution and particle identification (PID) capabilities. The negative ions regime has been demonstrated with three times smaller diffusion. Upcoming studies will focus on diffusion and detector Z-fiducialization via minority carriers.

Wavelength shifters for optically read out MPGDs, **Florian Brunbauer**

The effect of solid wavelength-shifting (WLS) materials on spatial resolution has been studied. The optimum configuration is the minimal distance between the amplification region and the WLS (micromegas). Pure noble gases: significant light emission in pure argon with TPB. THGEM-like gain structures to achieve stable high-gain operation in pure noble gases, even at low pressure.

Applications (Neutrons)

Performances of a Medium-Size Boron-coated GEM detector for thermal neutrons at the ISIS Neutron and Muon Source, Stephanie Cancelli

The improved Medium-Size BGEM detector (I-MS-BGEM) demonstrated good performance with thermal and epithermal neutrons. It achieved a counting rate stability of 99%, a gamma insensitivity factor of about $10^{-5}\ \gamma/n$, and a detection efficiency of 16% at 1.8 Å. Next steps include implementing a strip anode for imaging measurements.

Research on TPC physics experiments and simulation methods at Back-n white neutron source, Haizheng Chen

Development of the v2 Multi-Purpose TPC (MTPC) system and the simulation and analysis framework has been completed. Installation at Back-n finished. The Li-6 measurement is complete, while $^{1}H(n,n)$, $^{17}O(n,\alpha)$, and $^{235}U(n,f)$ are in progress. Next steps include implementing a double-sided target, replacing electronics, and adding a magnetic field to better identify charged particles. The MTPC has a wider range of applications and can replace other charged particle measurement detectors at Back-n.

Ceramic GEM neutron detector and its applications at China Spallation Neutron Source, Jianrong Zhou

A wide family of ceramic GEM neutron detectors have been developed and successfully applied in many instruments. Future steps: fabricate large area (1 m² level) and high-quality ceramic GEM by laser drilling, design high-speed ASIC chip for GEM detector, develop detector with 1 m² area, high detection efficiency(80%) and sub-mm resolution.

Applications (Space and/or X-Ray)

Application of Micro Pattern Gaseous Detectors in Space X-ray Polarimetry , **Weichun Jiang**

MPGD suitable for high-sensitivity X-ray polarization detectors. GPD has been adopted by eXTP-PFA which will be launched in 2030. TPC will be applied in WXPT and launched in 2035.

Micro Pattern Gaseous Detectors for Particle Detection in Space, **Hongbang Liu**

Application of GMCP (Gaseous Microchannel Plate) and Topmetal-L chip in POLAR-2/LPD & of THGEM in High Energy Cosmic Radiation Detection (HERD) TRD

Exploitation of a 2D triple GEM detector at the MASTU spherical tokamak, Celora Agostino

A TripleGEM (alu-GEM) detector was successfully tested as a diagnostic instrument at the MASTU spherical tokamak. The spectrum and imaging map were analyzed over time, showing a clear match with standard diagnostics. Optimization efforts aimed at mitigating neutron background have been identified to improve the signal-to-noise ratio (SNR), reduce pileup, lower the energy threshold, and study argon impurities in the tokamak.

Modelling and Simulation

Study of signal formation in the ERAMs of T2K TPC, **Daniele D'Ago**

A numerical simulation of the shepherd dog effect was conducted to model the charge spread in the DLC. Important steps, including measurements of ion mobility and Penning transfer estimation, have contributed to understanding signal formation in T2K ERAMs. A new setup/detector is being developed to further study ion mobilities.

Simulating Timing Performance of Resistive Detectors with Garfield++, **Djunes Janssens**

Overview of simulation methods and tools for time resolution studies on resistive detectors: microscopic charge transport, the extended Ramo-Shockley theorem, time walk corrections, and thermal noise contributions from resistive elements. Future steps: modelling large avalanche sizes with contemporary computing methods.

Numerical simulation of space charge effects in MPGDs, **Maxim Titov (on behalf of Supratik Mukhopadhyay)**

The Garfield++ framework is used to numerically model space charge accumulation in three important MPGDs: Micromegas, GEM, and THGEM. Due to the computational expense, simplifying assumptions have been made, and extensive use of parallelization has been implemented in the neBEM solver. A comparison with a fluid model based on a commercial FEM package has also been conducted.

Electronics

A 512-channel FEE prototype based on the custom ASIC for MPGD, Jiaming LI

A 512-channel front-end electronics prototype based on a custom ASIC has been developed to read the MPGD, achieving a charge resolution of 0.24 fC RMS and a time resolution of 1.2 ns RMS, with a dead time of 13 μs. This prototype is being considered for the RICH detector (hybrid THGEM-MicroMegas) at STCF.

Application of the VMM3a/SRS for tracking systems and TPCs, **Karl Jonathan Flöthner**

VMM3a/SRS is a trigger-less system for laboratory and test beam detector studies. Characterization of the new tracking AMBER triple GEM is being conducted in the laboratory and during test beam experiments. The TWIN GEM-TPC detector is used as testbench for TPC readout.

SALSA: a new versatile readout ASIC for MPGD detectors, Damien Neyret

Development of a versatile readout ASIC with large range of gain, peaking time, capacitance, input rate, sampling rate. Internal digitization and data processing to reduce bandwidth, continuous readout. Rad hard, low power consumption. SALSA1 prototype (front-end + ADC) produced, tests starting in November. SALSA2 prototype (fully featured, reduced number of channels) development ongoing: DSP architecture and data processing.

Progress on Readout Electronics for TPC for Large Collider Experiments, Zhi Deng

Variety of waveform sampling front-end chips for pad-type TPC readout developed. Latest WASA chip integrates analog front-end, ADC waveform sampling, digital filter, trigger logic and other circuit functions. Based on this chip a scalable TPC readout electronics system has been developed. A low-power energy and time measurement readout chip TEPIX for pixel TPC readout has been developed, which realizes sub-millimeter pixel readout through a high-density interposer substrate.

Production & Technology Transfer

Production of Resistive Micromegas: Technology Transfer to Industry, Mauro Iodice

The production of Double-Layer DLC Resistive Micromegas at CERN has reached an established high-quality standard and reliability, even for large sizes. Due to the large number of requests, the MPT Workshop is experiencing extended delay times.

R&D of new configurations can hardly be done outside CERN. Large-scale production: transfer of manufacturing technology to industries is essential. Ongoing successful acuities with ELTOS S.p.A.

Posters

Anastasios Belias	Future missions of the former LHCb Outer Tracker gaseous detector at GSI/FAIR
Anqi Wang	Study of MPGD based photo detectors for the RICH system in STCF
Changqing Feng	A Flexible Electronics System for the Readout of CSNS Multi-purpose TPC
Giorgio Dho	Impact of a strong electric field below the GEM on light yield and saturation in a He:CF4 based Time Projection Chamber
Hongkun Chen	An improve of performance in MTPC with waveform deconvolution technique
Hugo Natal da Luz	TPC Track Denoising with Machine Learning Techniques
Jiangyong Du	FOML， a deep learning based fast online multi-track locating algorithm for MPGD with silicon pixel sensors
Jieyu Zhu	Calibration for the SAMPA ASIC in HERD transition radiation detector front-end electronics
Jieyu Zhu	Prototype design of the high-precision clock generation and distribution for multiple detectors cooperative work at HIAF-HFRS
Jing Tian	Studies of an event-building algorithm of the readout system for HFRS-TPC
Liu We	An SU-8 Delayed Development Processing Technology for MPGD
Maxim Alexeev	Design and optimisation challenges while codesigning a new front-end ASIC together with a resistive Micromegas detector for AMBER experiment
Purba Bhattacharya	Study of Charge Dynamics in THGEM-based Detectors – A Numerical Approach
Qungang Wen	Research on rapid imaging with cosmic ray muon scattering tomography
Rui Zhou	Improvement of sensitivity for MeV Gamma ray Telescope using Time Projection Chamber technology
Sicheng Wen	Mass production and performance of large area thermal bonding Micromegas\DMM detectors
Songsong Tang	Development of a Portable Low Background α and β Detection Module based on Micromegas and Waveform Digitizing Electronics
Tianzhi Chu	Research on the calibration method of the avalanche gap of MTPC anode plate
Ting Wang	Design of Highly Integrated Muon Imaging Readout Electronics for Micromegas Detector
Xuexin Zhu	Multi-dimensional measurement ASIC for Micro-Pattern Gas Detectors
Yalçın Kalkan	New Structure UV-C Detector Using Photocathode Vapour
Yiding Zhao	A high rate and high timing photoelectric detector prototype with RPC structure
Yulin Liu	Performance study of 400mmx400mm and 600mmx600mm micromegas track detectors using cosmic rays
Zhujun Fang	Study on the bias analysis and correction in MPGD μTPC mode

The MPGD Conference Series

MPGD Conference series

- Kolymbari, Crete, Greece (2009)
- Kobe, Japan (2011)
- Zaragoza, Spain (2013)
- Trieste, Italy (2015)
- Philadelphia, USA (2017)
- La Rochelle, France (2019)
- Weizmann, Israel (2022)
- **Hefei, China (2024)**

- Prague, Czech Republic (2026)

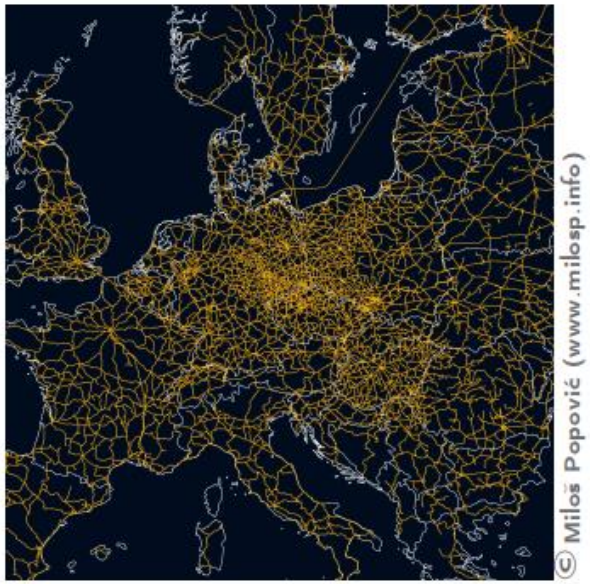
9th Micropattern Gaseous Detectors Conference 2026 in Prague

Hugo Natal da Luz

Institute of Experimental and Applied Physics
Czech Technical University in Prague

合肥, 18th of October, 2024

Reaching Prague



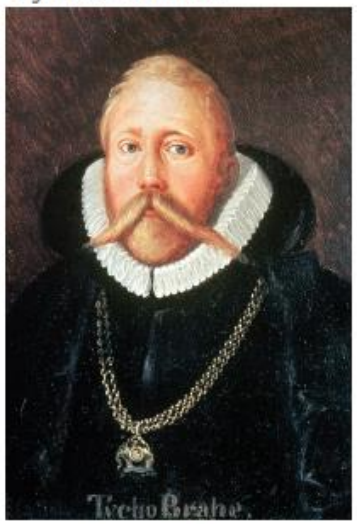
- Central Europe,
- Very good air and ground connections.

The city of Prague

IEAP CTU in Prague

Prominent physicists loving/living in Prague

Tycho Brahe



(1599–1601)

Johanes Kepler

(1600–1609)

Christian Doppler

(1835–1847)

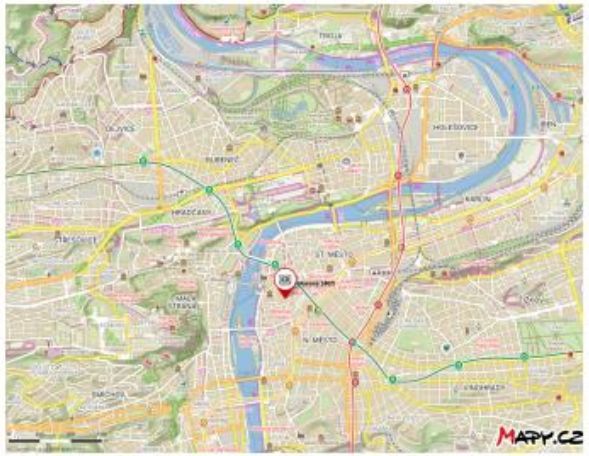
Albert Einstein

(1911–1912)

The IEAP CTU in Prague — General information

Institute of Experimental and Applied Physics, Czech Technical University in Prague:

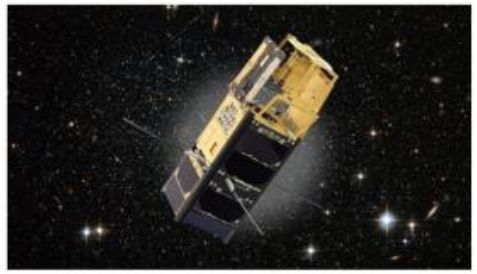
- Located in the center of Prague in historical building of Bethelem Palace.
- Founded in May 2002 as an experimental unit of the CTU for research namely on particle and nuclear physics,
- 90 employees divided in 5 departments (Electronics and Software; Experimental Physics; Applied Physics and Technology; Theory and Modelling; Administrative and Technical Services),
- Most of the R&D dedicated to pixellated solid state detectors (Founding member of Medipix2/3/4 collaborations),
- Development of large are scintillators for neutrino and astroparticle experiments,
- MPGD group started 5 years ago,

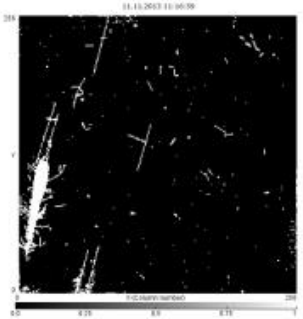


Science at IEAP CTU in Prague

Astroparticle physics

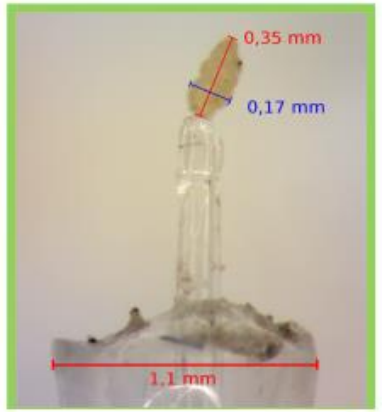
- Applications of pixel detectors in space
- Measurement of cosmic rays in space
- Pixel detectors in X-ray telescopes
- SATRAM is the first Timepix based particle telescope, operating in open space since May 2013





RTG imaging with sub-micron resolution

- Foraminifera – one-cell sea organism



Science at IEAP CTU in Prague

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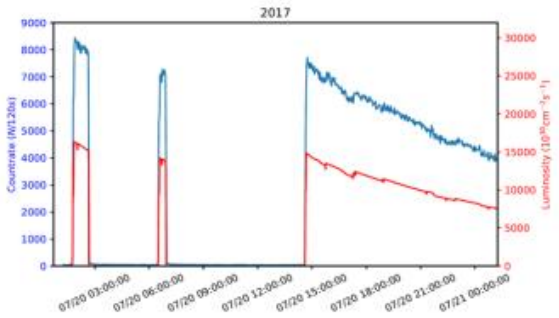
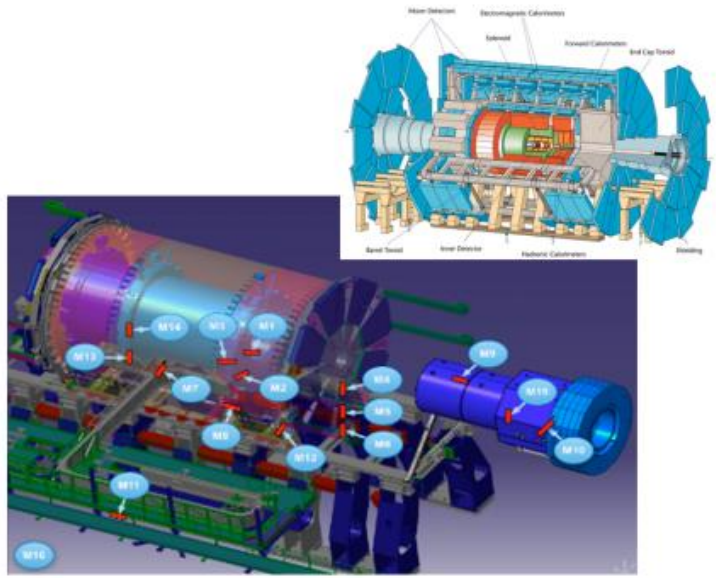
Astronaut Chriss Cassidy in the ISS with a USB powered TPX particle tracker
The tracker for ISS has been completely developed at IEAP and delivered to NASA in 2012.

ATLAS

- ATLAS-TPX network - radiation fields measurement and luminosity monitoring
  ATLAS hybrid pixel detector networks ATLAS-MPX/TPX gradually installed in the ATLAS experiment starting in 2008 and then in 2014 in the MoEDAL experiment
- Tau-trigger contribution
- AFP/ALFA upgrade



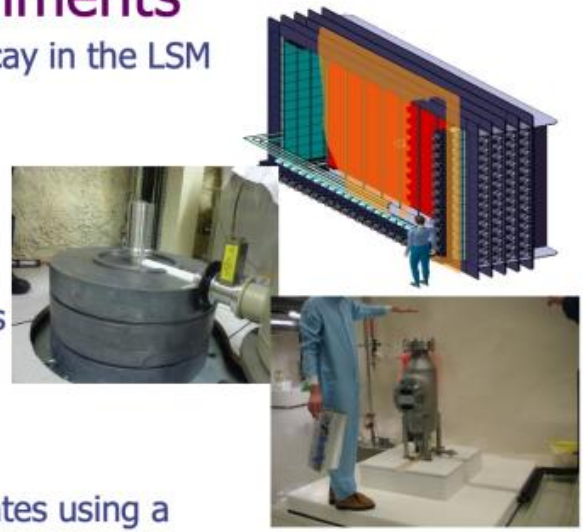


Van de Graaff accelerator

- Proton and ^{4}He up to 2 MeV/A
- works also as a source of monoenergetic neutrons from 300 keV to 17MeV
- VdG department hosts the MPGD lab.

Neutrino and underground experiments

- Experiments for the measurement of double beta decay in the LSM underground laboratory in Modane, France
  - NEMO 3, SuperNEMO, SPT, TGV, OBELIX
- Technologies for underground experiments
  - Ultra-low background technologies
  - Development of plastic scintillating detectors
- Theory for double beta decay.
- PICO experiment
  - SNOLAB underground laboratory.
  - Detection of neutralinos as dark matter candidates using a bubble detector.



The venue

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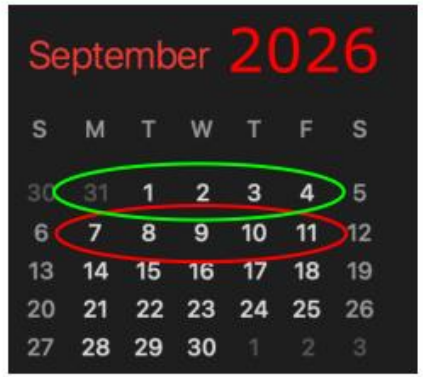
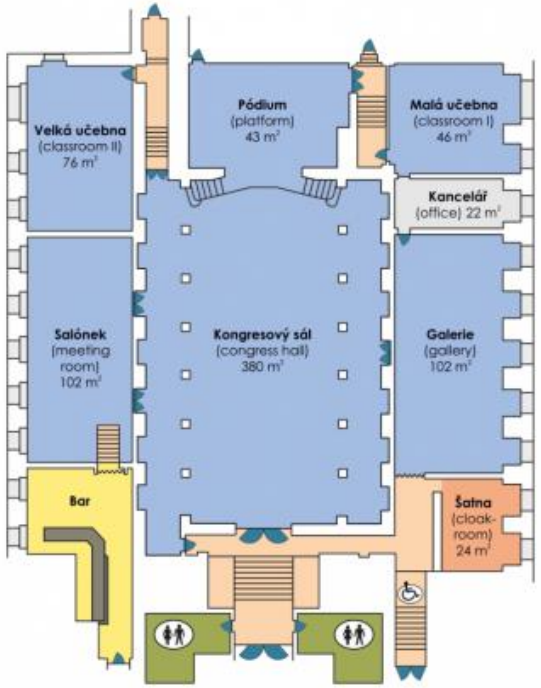
Possible dates (mark them in your calendar!)

- 31 August - 4 September
- 7-11 September
- 14 - 18 September



Conference venue — Masaryková kolej (Masaryk Dormitory Hotel)



The venue

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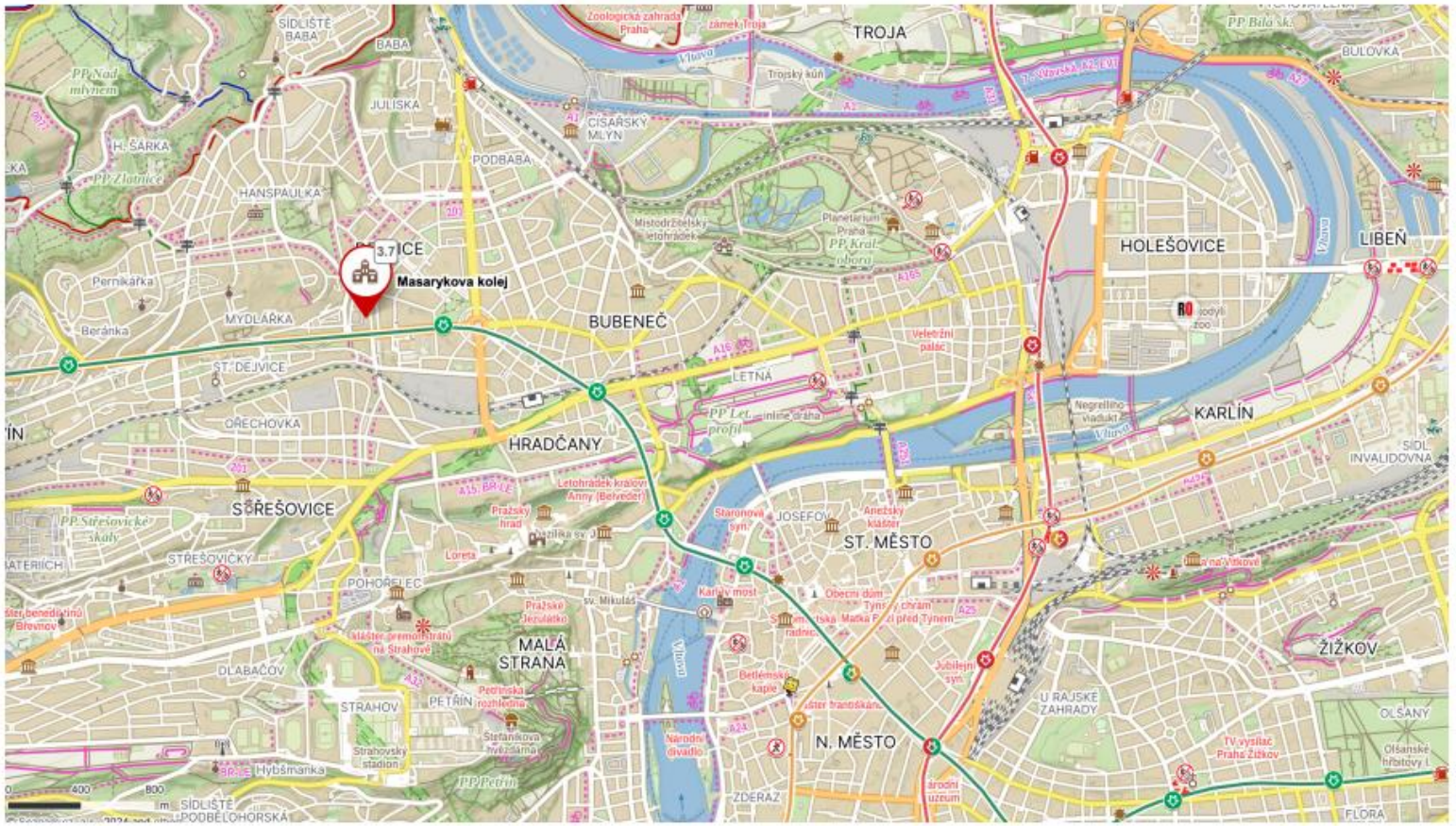

- Affordable accommodation in the building of the conference (students dormitory),
- Many hotels, hostels, guest houses everywhere in Prague.

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See you in Prague!!!

Conclusion

The 8th International Conference on Micro-Pattern Gaseous Detectors

10/14/2014 HeFei,CHINA

Feeding our interest and curiosity….

Anhui Museum （Anhui provincial museum)

State key laboratory of particle detection and electronics, National synchrotron radiation laboratory (both on USTC campus)

A final warning…

You may not get rid of us so easily.. Integration started…

And a special Thank…

… to the Local Organizing Committee and in particular to Jianbei Liu for the excellent work done

...to all USTC colleagues and students who warmly welcomed us, offering the opportunity for fruitful discussions and exchanges on our research work, significantly improving and inspiring our future research.

We would like to once again express our strong congratulations on the achievements in MPGD and in detector R&D and the establishment of an impressive research center, both in terms of scientists and facilities.

谢谢