Rolf Schön

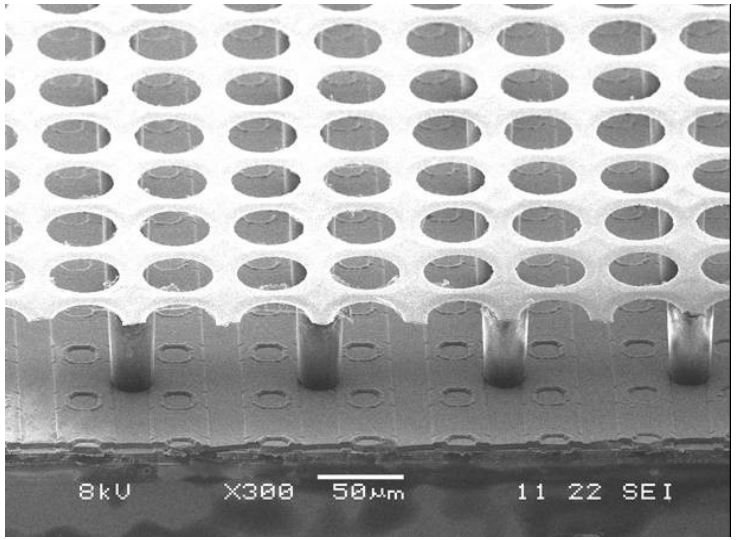
Background

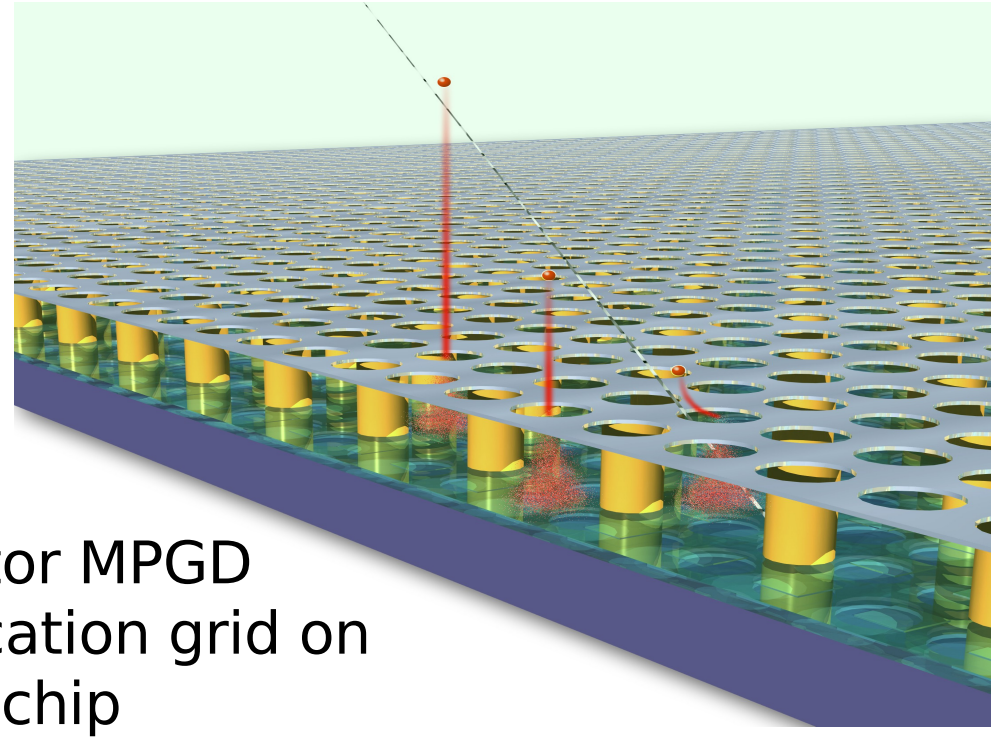
- Diploma in April 2010 at University of Karlsruhe
- Thesis topic: 'Study of bremsstrahlung spectrum of tritiated water at the Tritium Laboratory Karlsruhe'
- Home country: Germany

Present status

- PhD at Nikhef, Amsterdam (since May 2010)
- MC-PAD Project 5: TPC with MPGD read-out
- Supervisor: Jan Visser
- Promoter: Els Koffeman (University of Amsterdam)

My subject

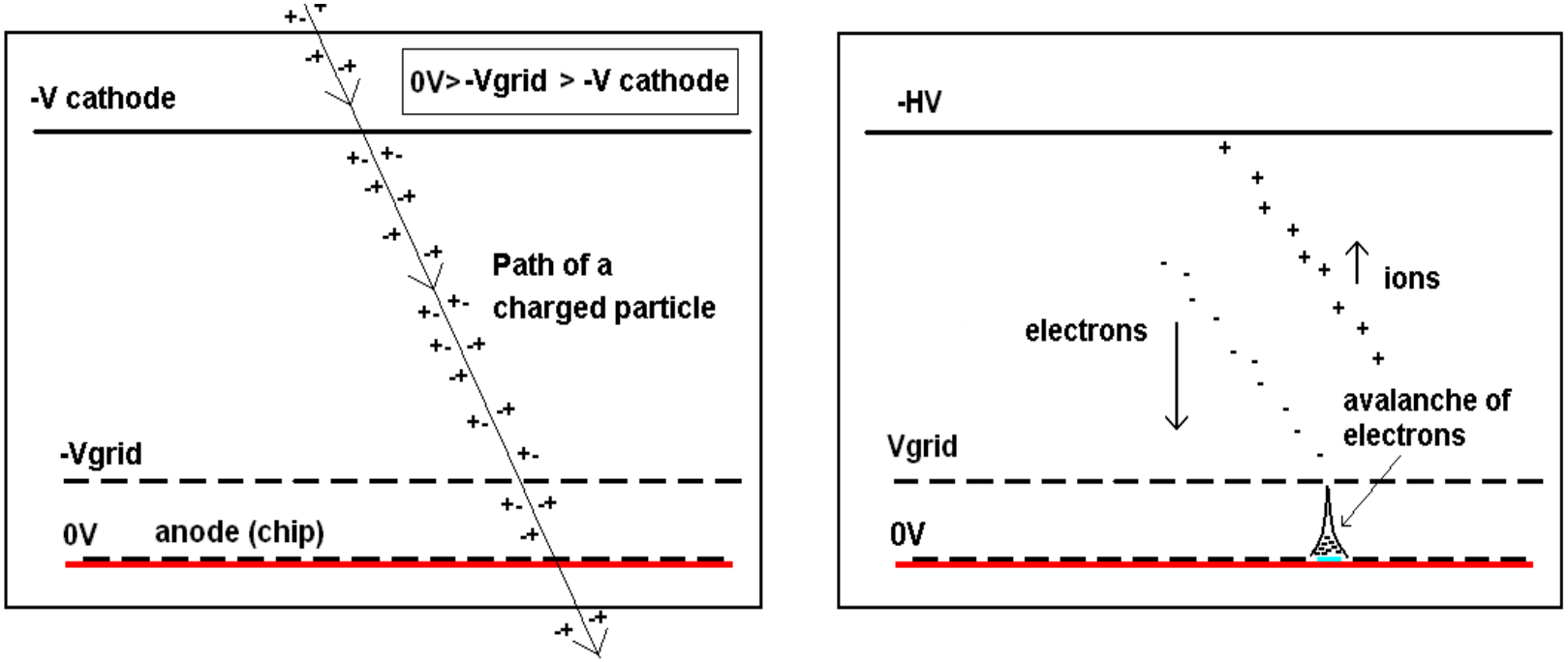




Gridpix detector

- Micro-pattern gas detector MPGD
- Micromegas-like amplification grid on top of a pixelized anode chip

The principle



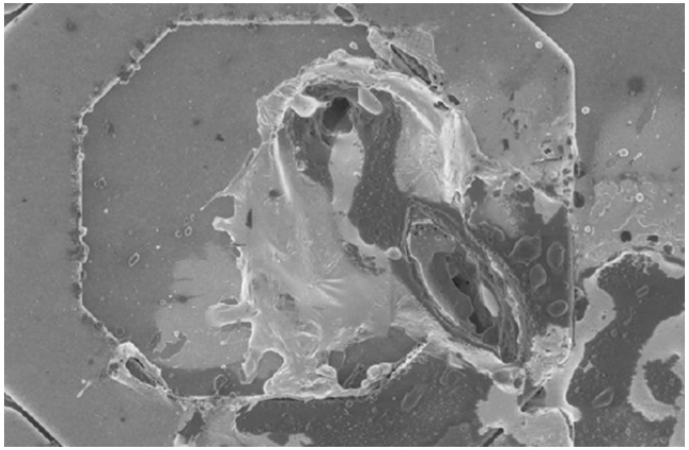
Gas inside the drift chamber

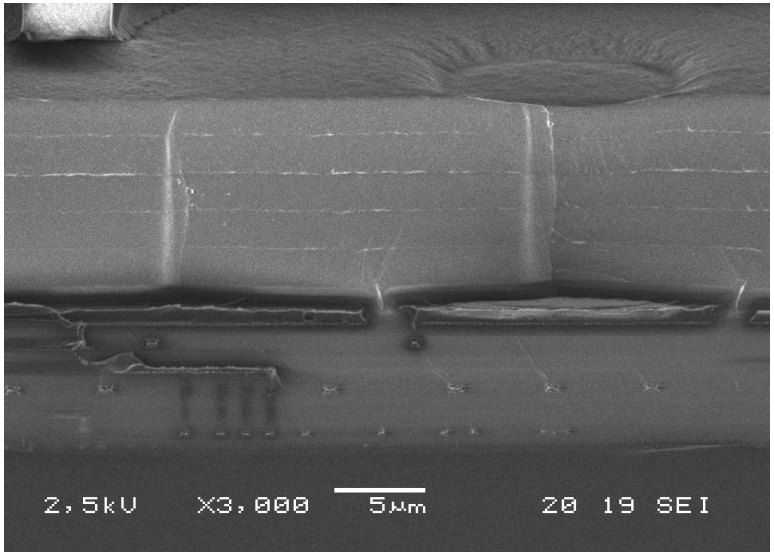
- Mixture: drift gas + quenching gas
- E.g. He/iC_4H_{10}, Ar/iC_4H_{10}, CO_2/DME

Spark protection

Discharges can melt parts of grid or chip

- Reasons: sharp edges, avalanche gain fluctuations, highly ionizing particles
- Chip can be entirely destroyed





Spark protection

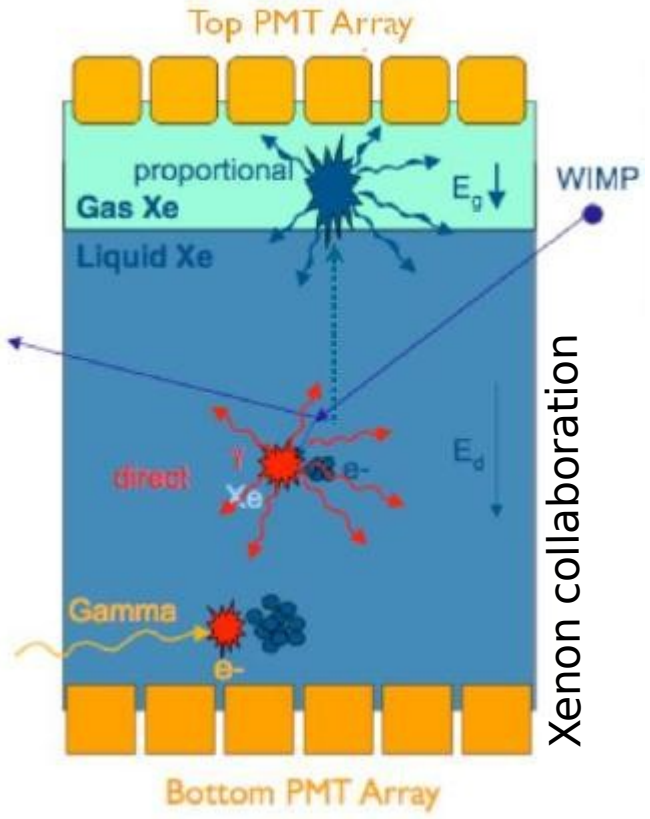
- Additional layer of resistive material on the anode
- Hydrogenated amorphous Si
- Silicon-rich SiN

New application

Gridpix in Dark Matter Search Experiments?

- XENON1T uses liquid Xe
- WIMPs scatter elastically off Xe nuclei
- Nuclear recoil identified by combination of scintillation and ionization signal

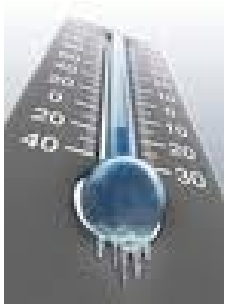
- Gridpix offers high single electron detection efficiency of over 95%
- Possibility to improve signal by combining top PMTs with Gridpix



Challenge

Need to test Gridpix at low temperatures

- Until now very few tests below room temperature
- Liquid xenon (LXe) @ T = -108°C (165 K)



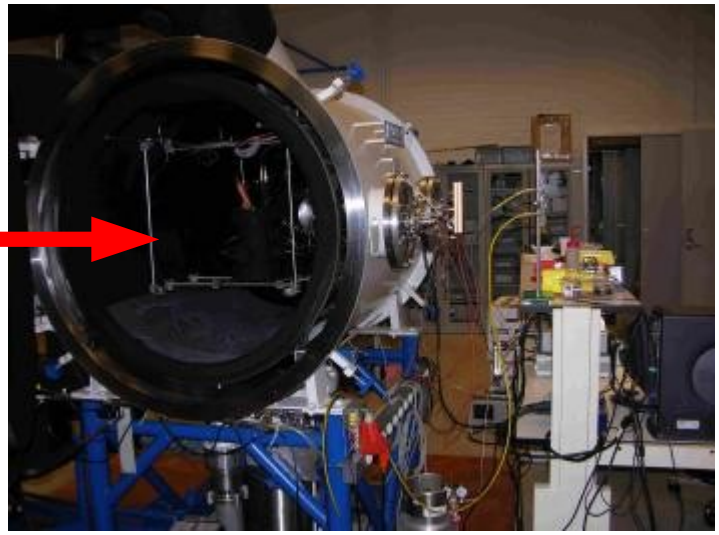
Gridpix suited to operate in such atmosphere?

- Is its functionality still given?
- Does its performance diminish? If yes, will Gridpix still be able to improve read-out performance of XENON TPC?
- Satisfying gain in pure gas or quenching gas needed?

Meeting the challenge

Experiments in vacuum cryo-chamber

- Dutch National Laboratory for Aerospace
- Gridpix operational at least down to -73°C in Ar/iC_4H_{10} 90/10 mixture and -50°C in pure Ar gas
- Master thesis of M. van Dijk
- Abort tests due to vacuum breakdown

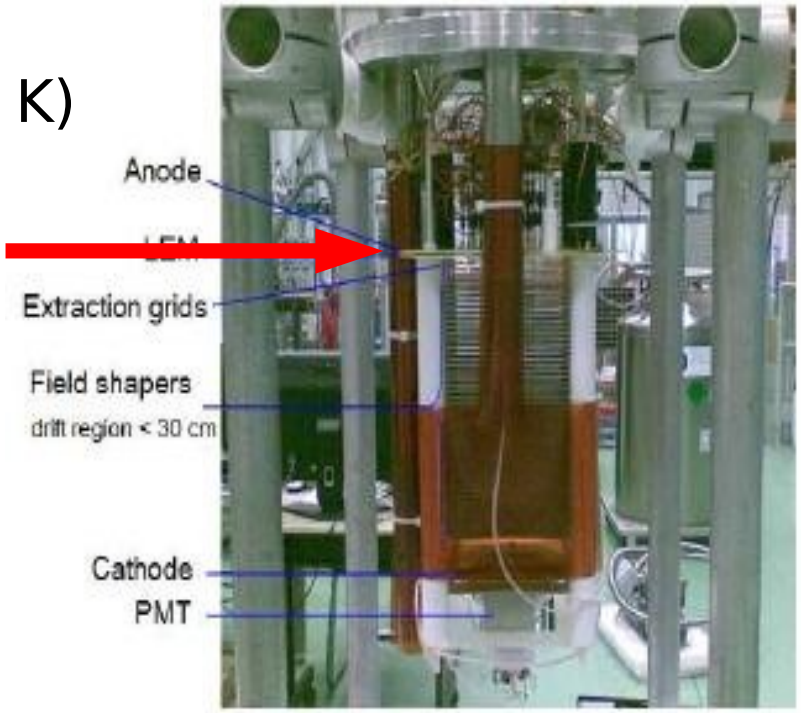


M. van Dijk

Upcoming work

New collaboration with Rubbia group at CERN

- Use LAr test cyrostat of the ArDM experiment to reach temperatures T = -186°C (87 K)
- Construct support structure for Gridpix detector to be mounted inside the cryostat
- Preliminary tests to check suitability of detector's electronical components

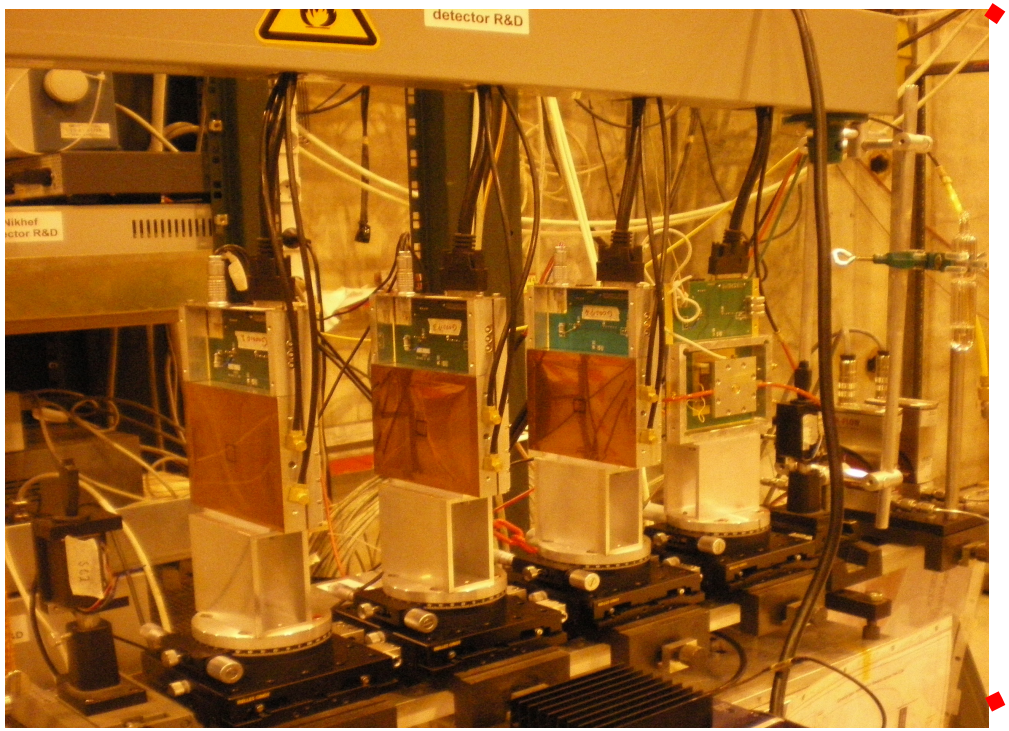


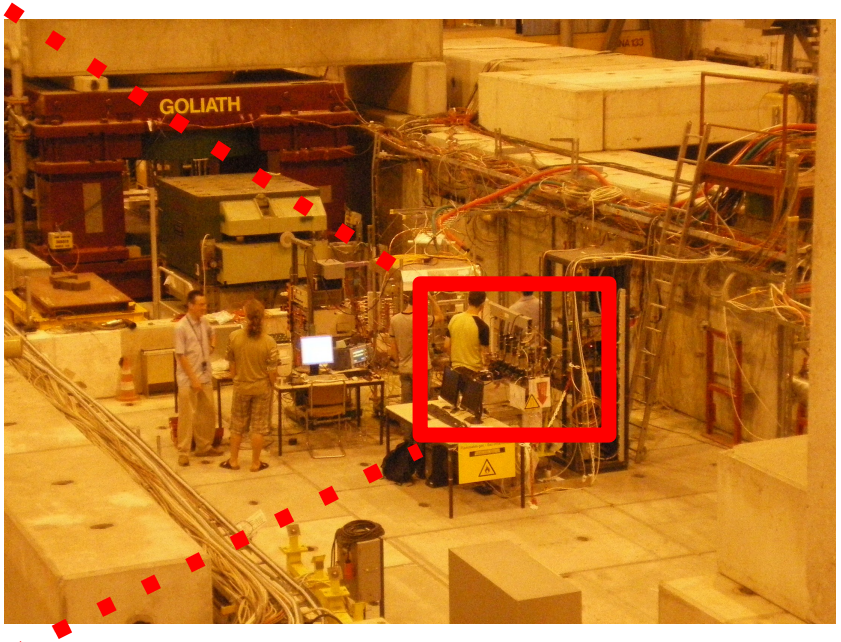
ArDM collaboration

Additional work

Not directly related

- Participating in the group's test beam campaign at CERN's SPS





Other activities

Courses

- Topical lectures on gravitational waves (Nikhef)
- BND Summer School on QCD (Oostende, Belgium)
- Dutch language course (intended)
- C++ course (right after this meeting)

Teaching tasks

- Course assistant in Numerical Physics (2nd year students; current semester)

Institute's outreach activities

- Open Day at Nikhef (09 Oct 2010)
- Physics@FOM Conference (18-19 Jan 2011)

Thank you for your kind attention during my first talk as PhD!