



Michael Reichmann

Self Presentation

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Biography

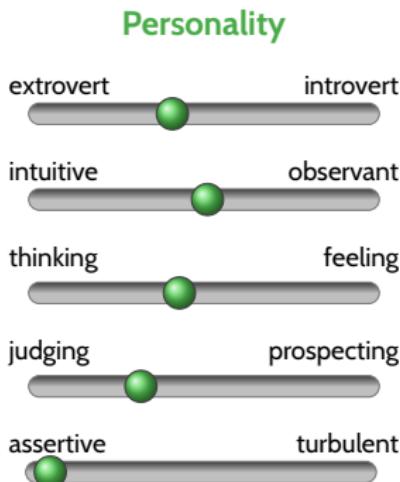


Michael Reichmann

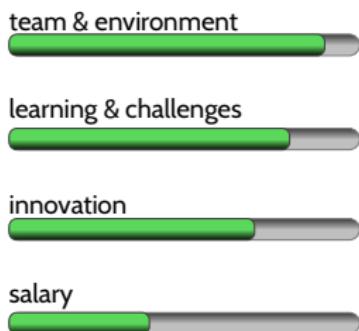
"Ultimately real is only the present moment of physical efficiency."

Fyodor Shcherbatskoy

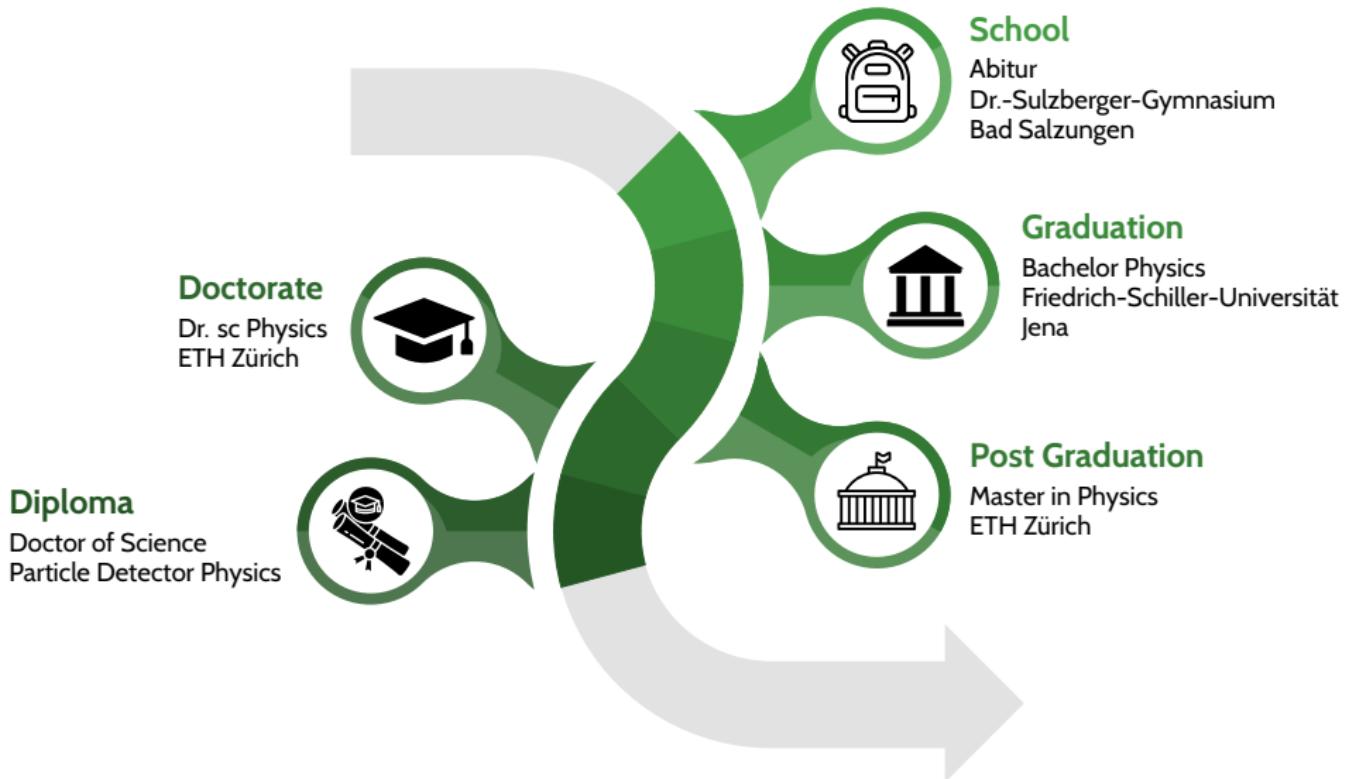
Age	34
Education	Dr sc.
Location	Wroclaw, PL
Personality Type	Executive ESTJ-A



Motivations



Education



Key Skills & Expertise

Languages

German native

English C2

Russian B2

Skills



Strengths

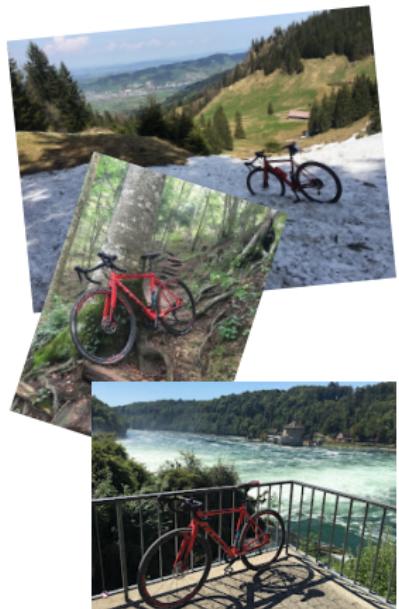
- analytical thinking
- team work
- fast learning
- direct & honest
- structured

Weaknesses

- perfectionism
- judgemental
- boredom

Personal Life & Hobbies

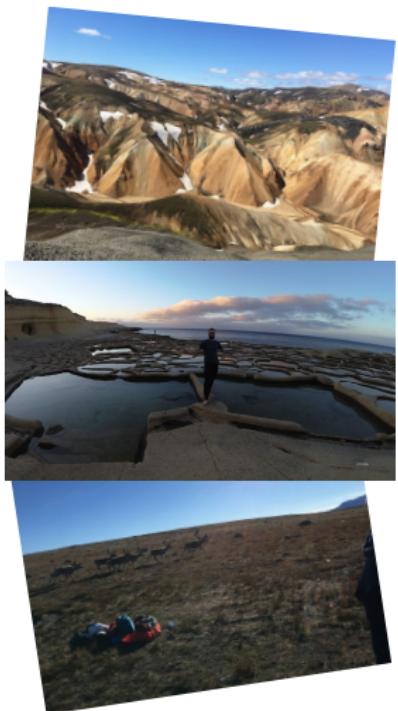
Cycling



Family



Travel



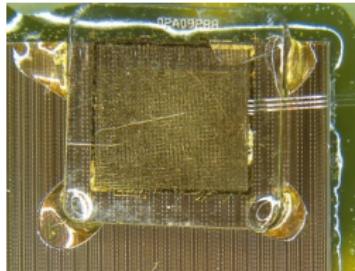
Work Experience

Customer Support



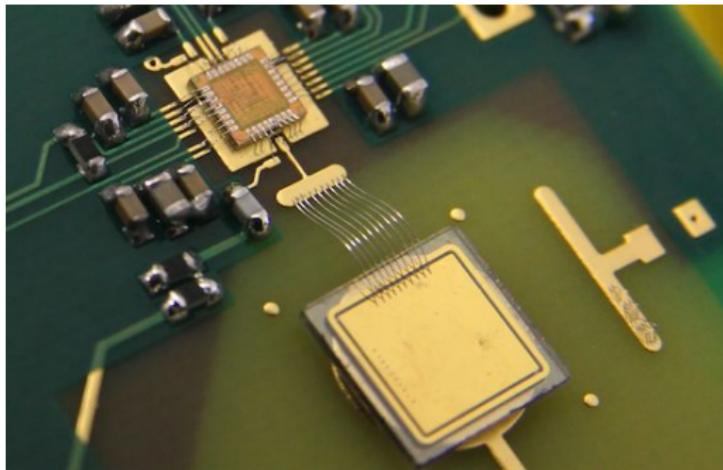
- in-game support an MMORPG
- working with both German & English
- customers ask everything
- very good understanding required
- keep calm & friendly

Doctorate



- studying pCVD diamond as material for particle detection
- setting up experiment
- developing data analysis framework

Rate dependence of pCVD diamond pad detectors



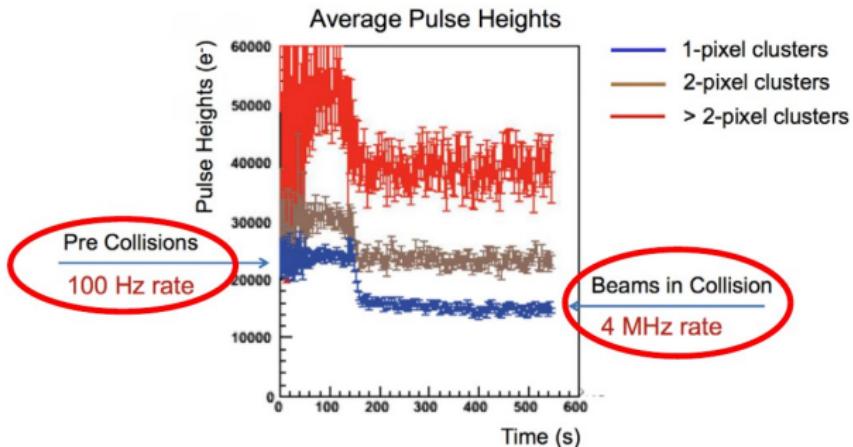
Goal:

- study signal response as a function of incident particle rate

Main Challenges:

- design and construct experimental setup and run the experiments
- analyse the data

Rate dependence of pCVD diamond pad detectors



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Rate dependence of pCVD diamond pad detectors

RD42 collaboration

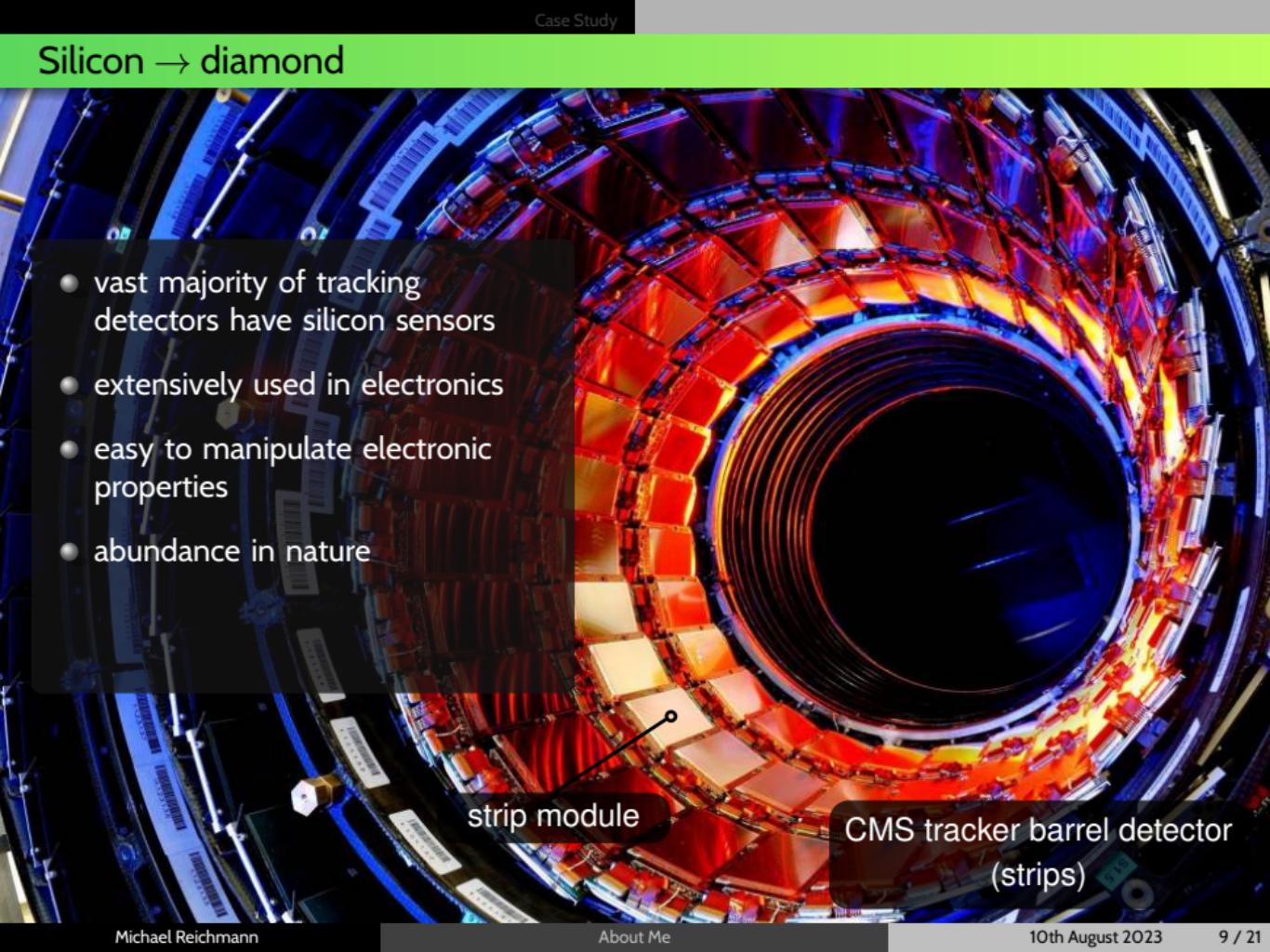
- part of the CERN RD42 collaboration (~ 100 members)
- detectors developed and provided by the collaboration
- I was leading group of 3 ~ 10 during the experiments

R. Wallny,^{b,1,*} M. Artuso,^a L. Bäni,^b V. Bellini,^c B. Bentaleb,^d P. Bergonzo,^c A. Bes,^e J.-M. Brom,^f G. Chiodini,^b D. Chren,^f V. Cindro,^g G. Claus,^h J. Collot,ⁱ J. Cumalat,^j A. Dabrowski,^k D. Dauvergne,^f S. Ditalia Tchernij,^l G. Eigen,^m V. Eremin,ⁿ P. Everaere,^f J. Forneris,^l L. Gallin-Martel,^j M.-L. Gallin-Martel,^j K.K. Gan,^o M. Gastal,^o A. Gentry,^f M. Goffe,^f J. Goldstein,^q A. Gorisek,^p J. Grossé-Knetter,^o B. Hilti,^b D. Hits,^b C. Hoarau,^f M. Hoeferkamp,^f J. Hosselet,^f F. Hügging,^c C. Hutson,^q R. Jackman,^q R. Jennings-Moors,^q H. Kagan,^o K. Kanxheri,^o M. Kis,^o G. Kramerberger,^o M. Kruger,^o A. Lacoste,^o E. Lukosi,^o C. Maazouz,^o M. Malli,^o I. Mandić,^o S. Marcatili,^o A. Marino,^o C. Mathieu,^o M. Menichelli,^o M. Mikuz,^o R. Molle,^o A. Morozzi,^o F. Moscatelli,^o J. Moss,^o R. Mountain,^o J.-F. Muraz,^o E.A. Narayanam,^o A. Oh,^o P. Olivero,^o D. Passeri,^o H. Pernegger,^o R. Perrino,^o F. Picollo,^o A. Porter,^o A. Portier,^o R. Potenza,^o A. Quadt,^o F. Rabli,^o A. Re,^o M. Reichmann,^b S. Roe,^o O. Rossetto,^o P. Salter,^o D.A. Sanz Becerra,^o C. Schmidt,^o S. Schnetzer,^o S. Seidel,^o L. Servoli,^o R. Shivaraman,^o S. Smith,^o B. Sokpo,^o V. Sopko,^o J. Sorenson,^o S. Spagnolo,^o S. Spanier,^o K. Stenson,^o R. Stone,^o B. Stugu,^o C. Sutera,^o M. Traeger,^o W. Trischuk,^o M. Truccato,^o C. Tuve,^o J. Velthuis,^o E. Verbitskaya,^o S. Wagner,^o J. Welch,^o T. Wengerl,^o M. Yamouji,^o J. Zaleckas^o and M. Zavrtanik^o

^aSyracuse University, Syracuse, NY, USA^bETH Zürich, Zürich, Switzerland^cINFN/University of Catania, Catania, Italy^dUniversity of Colorado, Boulder, CO, USA^eUniversity College London, London, UK^fLPC/CNRS-Grenoble, Grenoble, France^gIPHC, Strasbourg, France^hINFN-Lecce, Lecce, ItalyⁱCzech Technical Univ., Prague, Czech Republic^jJožef Stefan Institute, Ljubljana, Slovenia^kCERN, Geneva, Switzerland^lUniversity of Torino, Torino, Italy^mUniversity of Bergen, Bergen, NorwayⁿAffiliated with an institute covered by a cooperation agreement with CERN

Silicon → diamond

- vast majority of tracking detectors have silicon sensors
- extensively used in electronics
- easy to manipulate electronic properties
- abundance in nature

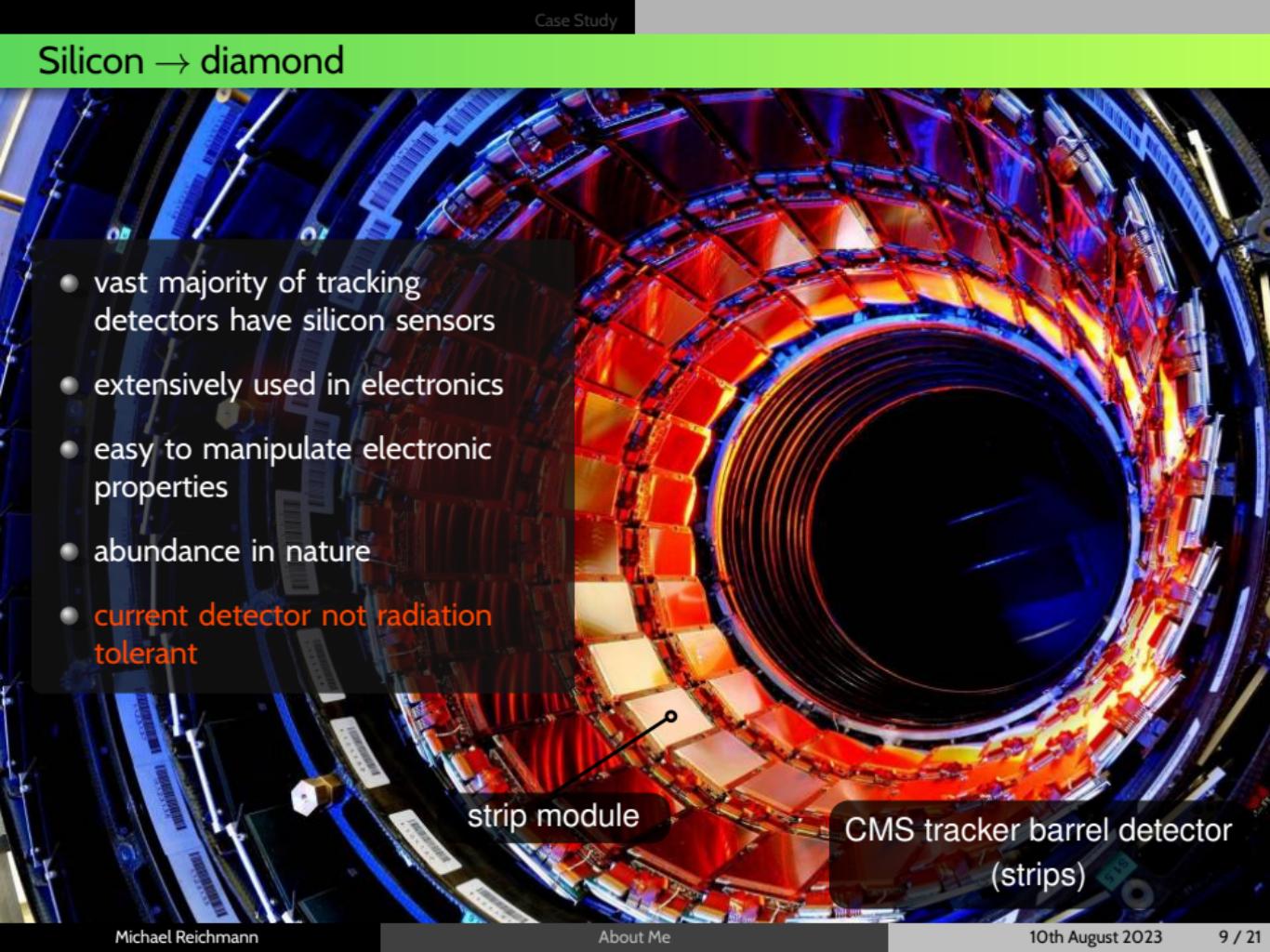


strip module

CMS tracker barrel detector
(strips)

Silicon → diamond

- vast majority of tracking detectors have silicon sensors
- extensively used in electronics
- easy to manipulate electronic properties
- abundance in nature
- current detector not radiation tolerant



strip module

A photograph of the CMS tracker barrel detector at CERN. The detector is a complex cylindrical structure composed of many concentric layers of silicon sensors. A specific module, labeled 'strip module', is highlighted with a black callout bubble and a pointer line. The module is a rectangular block with a grid pattern of gold-colored strips. The background shows the intricate mechanical and electrical components of the detector.

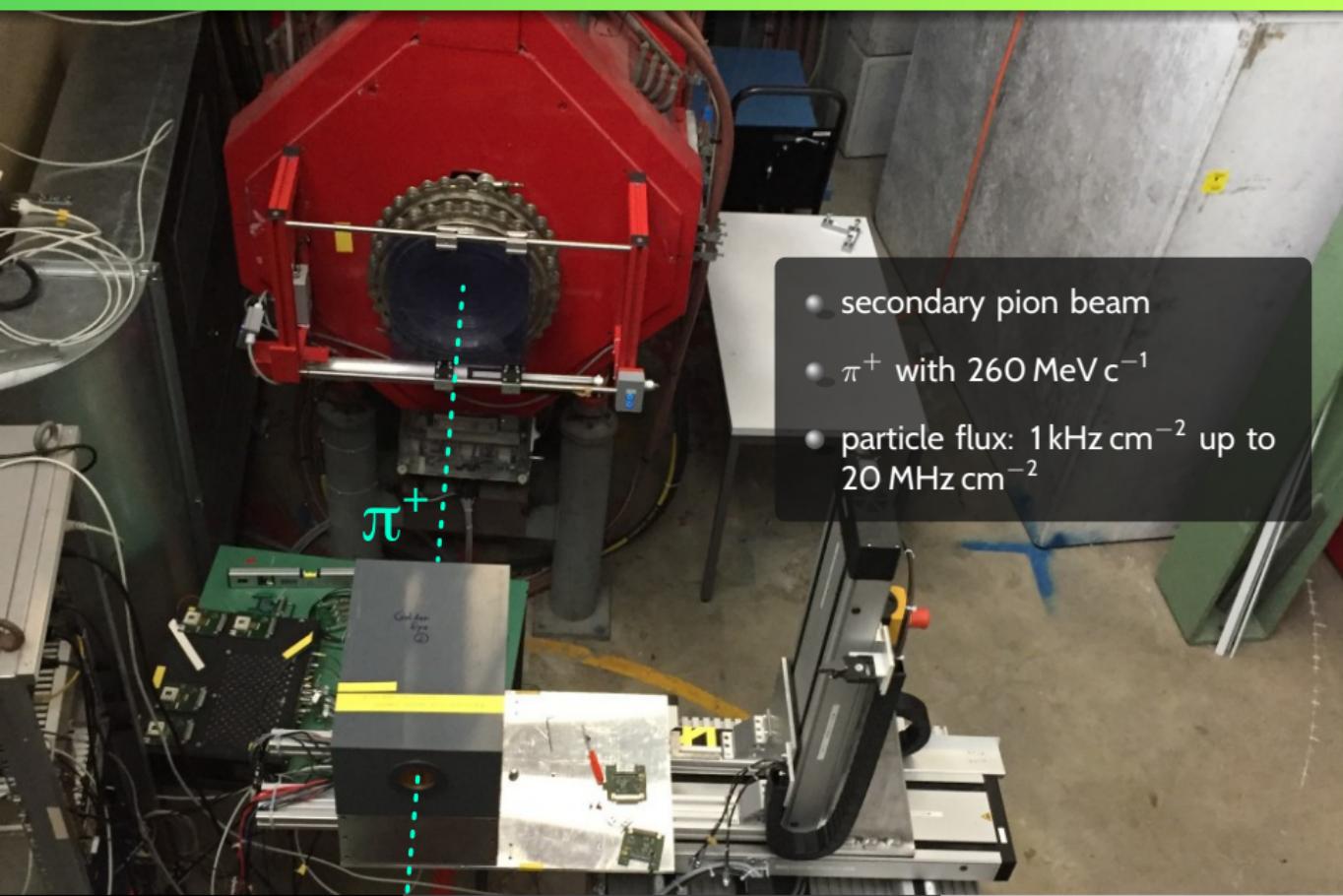
CMS tracker barrel detector
(strips)

Test site

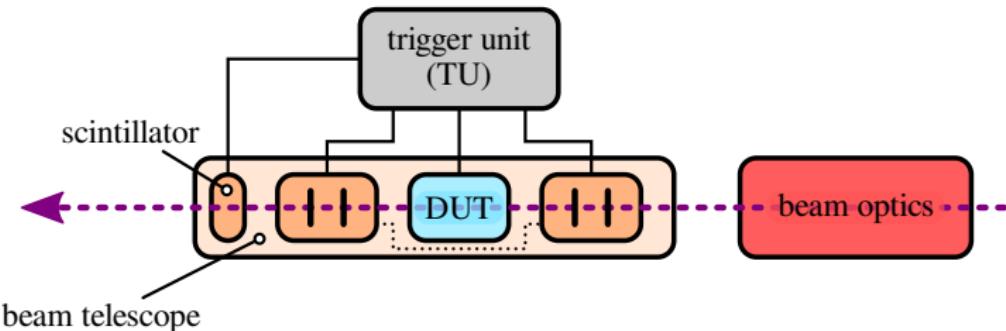
- high intensity proton accelerator (HIPA) at Paul Scherrer Institut (PSI)
- 590 MeV bunched proton beam
- up to 1.3 MW beam power



π M1 beam line

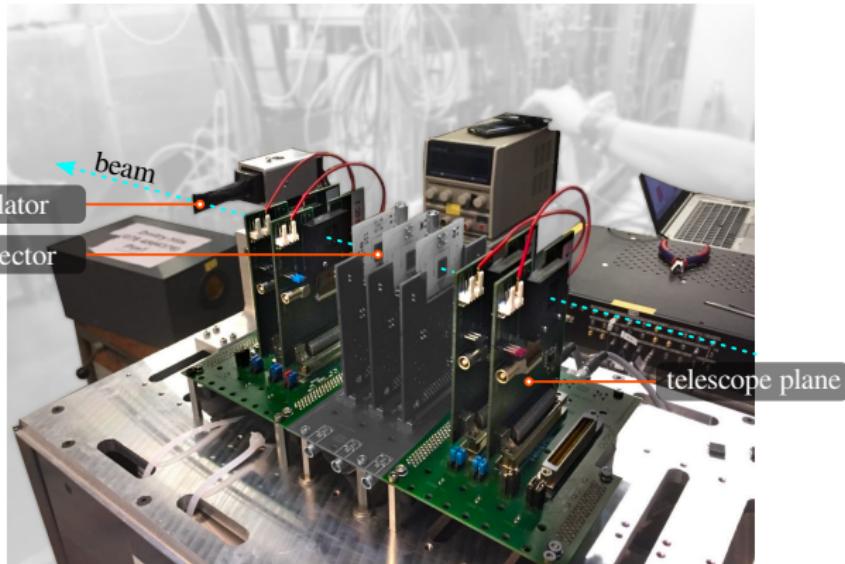


Setup



- commissioning beam telescope made from hybrid Si-pixel detectors
- reconstruct trajectory of the beam particles
- other instruments: digitiser, power supplies, trigger unit, NIM logic ...

Setup



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Setup - challenges & solutions

Challenges ⇔ Solutions

- | | |
|--|--|
| detector incompatible with
readout device | <ul style="list-style-type: none">• extending readout software and firmware
to read analogue levels of the detector |
| problems with reflections and
signal routing on the PCB | <ul style="list-style-type: none">• investigating chip signals with oscilloscope
redesigning the PCB with an
electrical engineer |
| tedious setup and initialising process | <ul style="list-style-type: none">• writing code to automate the process |

Data-acquisition



- adjusting and further developing existing software
- controlling and monitoring several devices
- save combined data stream
- long process of improvements → in the end data was taken autonomously

Debugging ...

```
...Configured (totale_konfiguration)  
*** Break *** segmentation violation
```

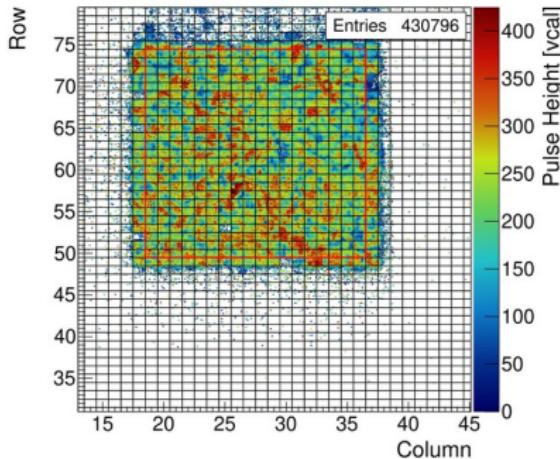
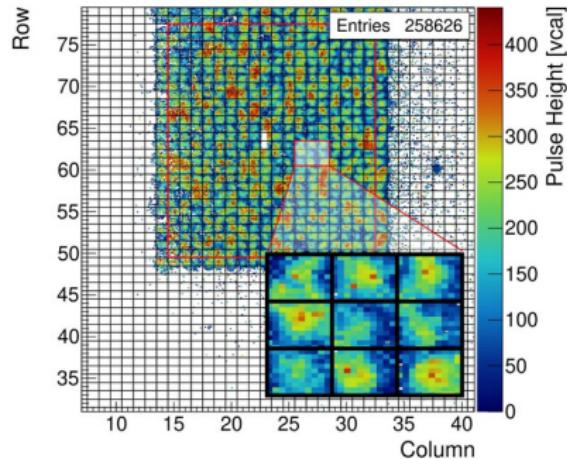
There was a crash.
This is the entire stack trace of all threads:

```
Thread 5 (Thread 0x7f0034782700 (LWP 3079)):  
#0 0x00007f003bb0b12d in poll () at ./sysdeps/unix/syscall-template.S:81  
#1 0x00007f003692ecf3 in handle_events () from /usr/local/lib/liblfd2xx.so  
#2 0x00007f003692ef0 in libusb_handle_events_timeout () from /usr/local/lib/liblfd2xx.so  
#3 0x00007f0036933d7d in poll_async_ libusb () from /usr/local/lib/liblfd2xx.so  
#4 0x00007f003b808182 in start_thread (arg=0x7f0034782700) at pthread_create.c:312  
#5 0x00007f003bb1847d in clone () at ./sysdeps/unix/sysv/linux/x86_64/clone.S:111
```

```
Thread 4 (Thread 0x7f00267ec700 (LWP 3080)):
```

- several beam tests → each time install setup
- many devices, various persons, different programming languages, new stuff ...
- errors occurred
- on-site debugging, programming and developing

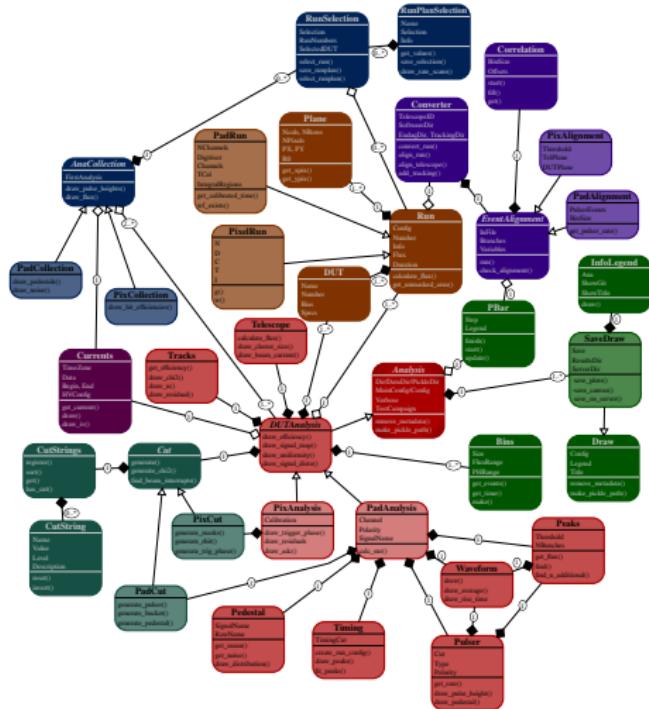
Analysis



- developed analysis framework from scratch with >10 000 lines of code
- converting raw data, aligning telescope and data, tracking, analysing
- python script utilising several other scripts in python and C++

Analysis code

- modular architecture → object-oriented
 - open-source ([github](#))
 - well documented
 - developed [ROOT wrapper](#) for plotting data



Results

- developed beam telescope
- irradiated pCVD diamond depends less than 2% on incident particle rate
- presented on several international conferences
- published in three conference proceedings
- ...more in my [thesis](#)

Michael Philipp Reichmann

A Particle Tracker for an Extreme Radiation Environment with Strongly Changing Fluxes: pCVD Diamond

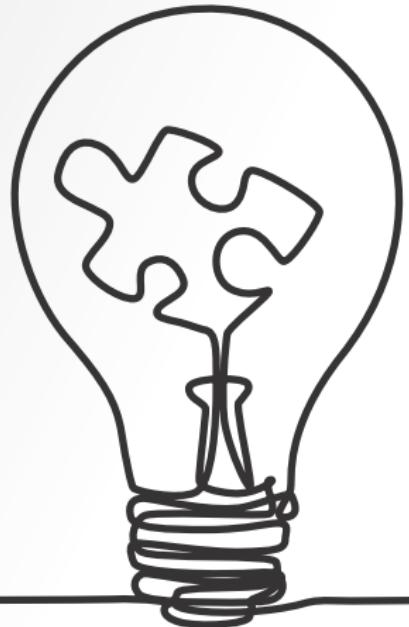
Vision

- working with world leading detectors
- impact on world of science
- installing & repairing detectors
- analysing & debugging software
- collaborating with colleagues
- new: working with clients



Conclusion

- good fit for the job
- knowledge of detectors
- scripting and programming/debugging skills
- experience with lab work and using/interfacing instruments
- innovative and willing to learn
- job very interesting for me



Technical Task

- Solution ...



CVD Chemical Vapour Deposition

pCVD poly-crystalline Chemical Vapour Deposition (CVD)

PSI Paul Scherrer Institut

HIPA high intensity proton accelerator