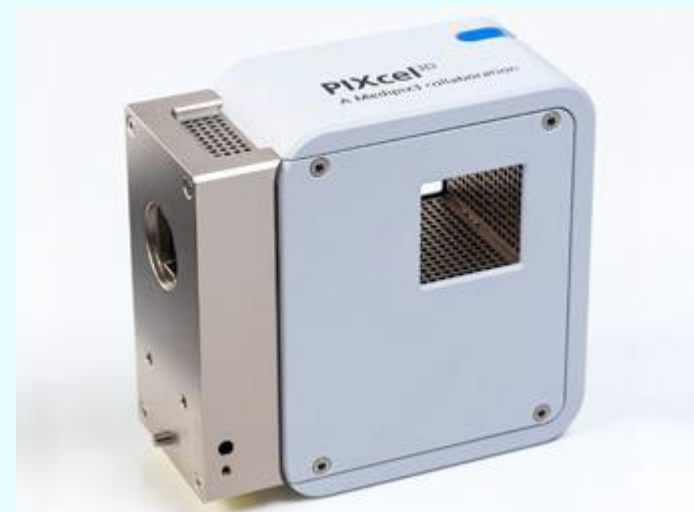


# 20 years of collaboration with CERN on Medipix technology as large enterprise

Roelof de Vries  
17-6-2022



# Agenda



- Who is Malvern Panalytical?
  - <https://www.malvernpanalytical.com/>
- How we got involved in the Medipix collaboration.
- What we have made as a product.
- Experience/observations with respect to Technology Transfer
- The future

# Our history



**1931**  
Philips Analytical is formed (part of Royal Philips)



**1971**  
Malvern Instruments is formed



**1976**  
Claisse is formed

**1977**  
Microcal is formed

**1990**  
ASD is formed

**1993**  
OMEC is formed

**1997**  
Malvern Instruments is acquired by Spectris



spectris

**2002**  
Philips Analytical acquired by Spectris and renamed PANalytical



**2008**  
Viscotek (Separations) acquired by Malvern

**2009**  
Creoptix is formed

**2010**  
OMEC acquired by Malvern

**2012**  
ASD acquired by PANalytical

**2013**  
NanoSight acquired by Malvern

**2014**  
CLS is formed

**2014**  
Claisse acquired by PANalytical and MicroCal acquired by Malvern

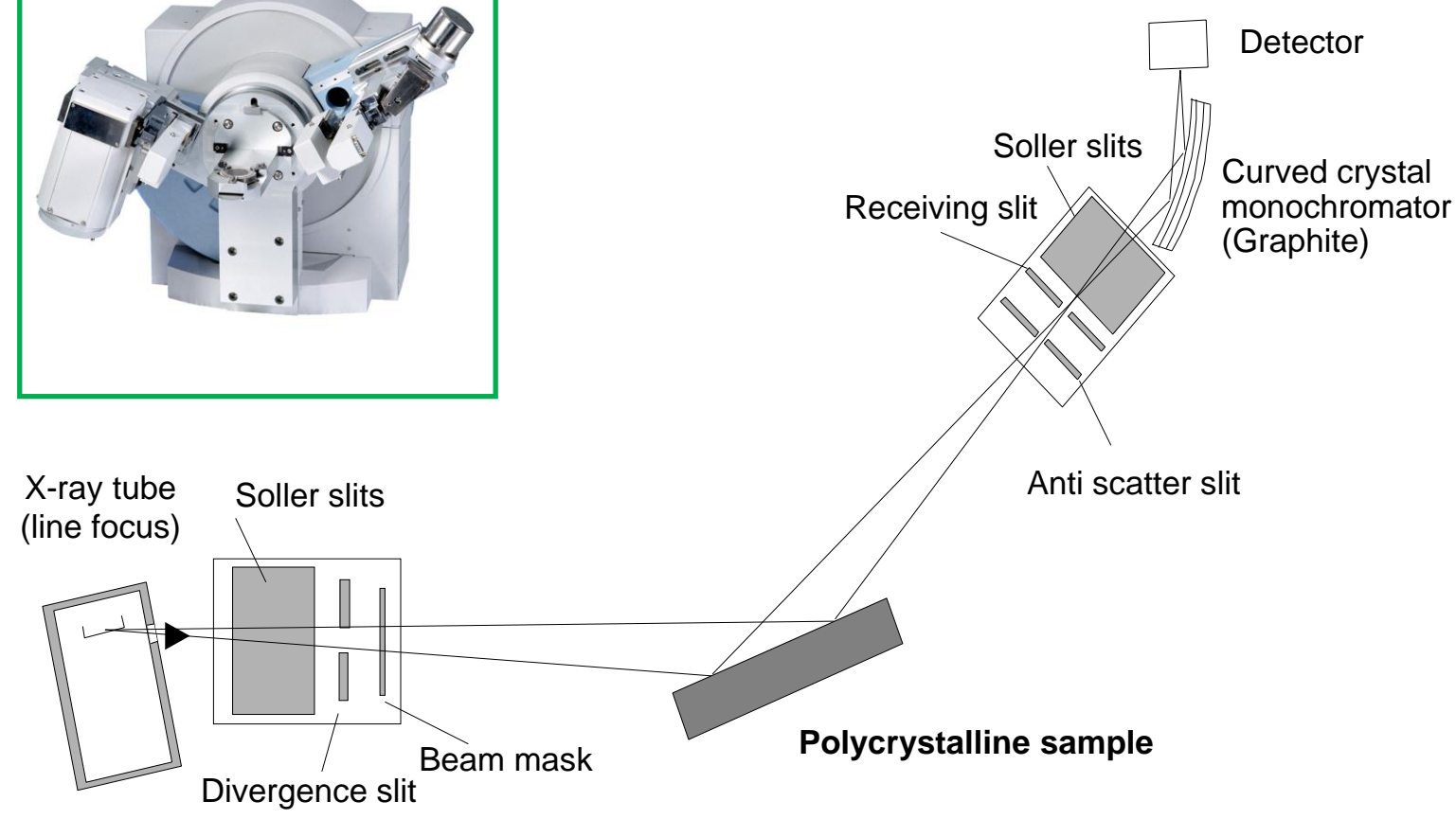
**2017**  
Malvern Instruments and PANalytical merge to become Malvern Panalytical



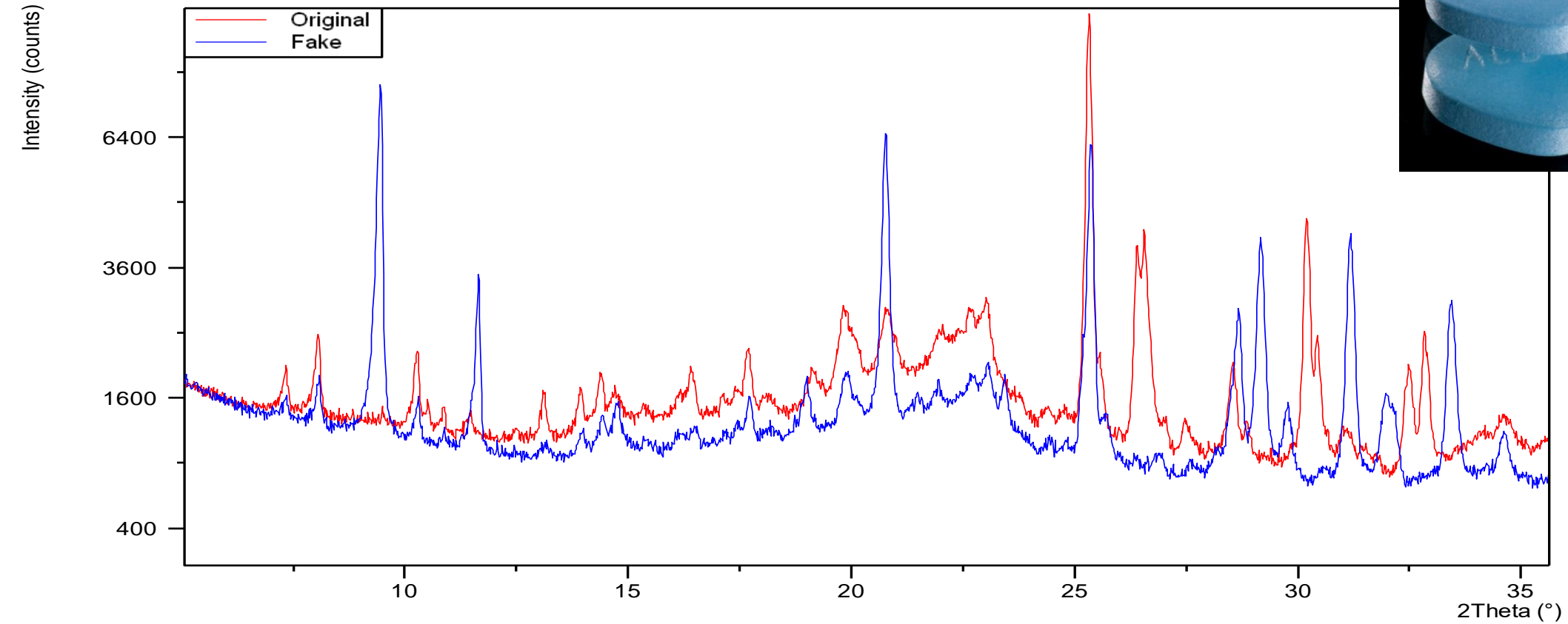
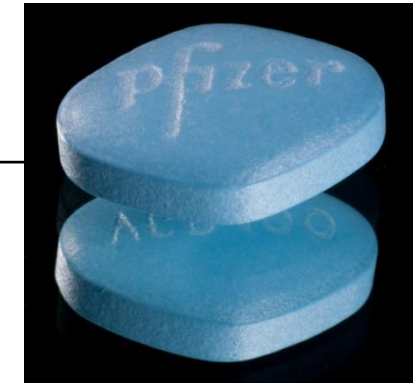
**2021**  
CLS integrated in Malvern Panalytical

**2022**  
Creoptix acquired by Malvern Panalytical

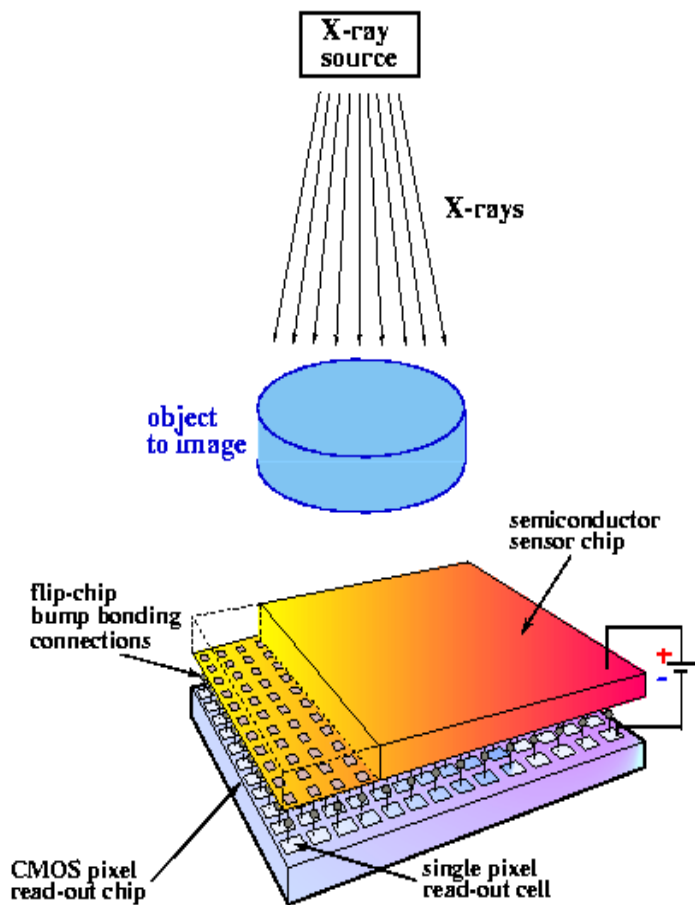
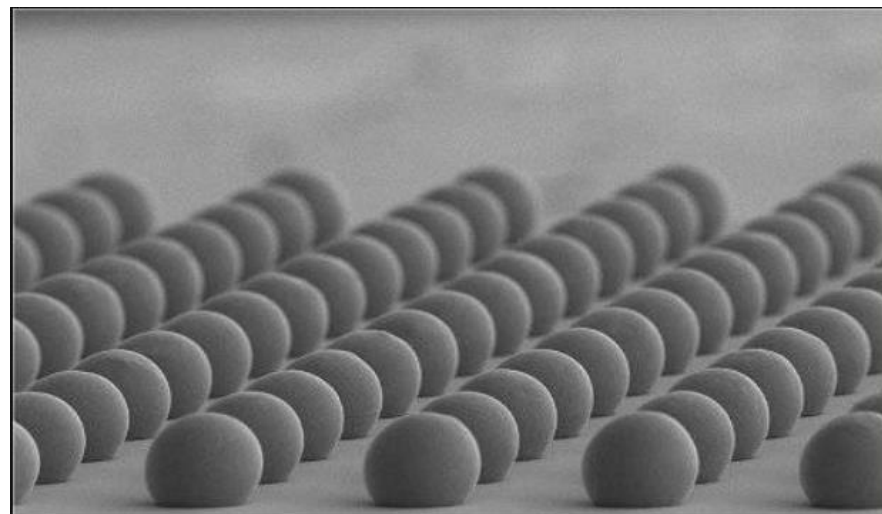
# Powder diffraction



## A typical example



# Medipix technology



Pixel detectors



What we have made as a product

# Evolution of the product



August 2007: 1D version, Medipix 2



August 2010: 2D version, read out electronics integrated, Medipix 2



August 2014: 2D version, Medipix 3, improved design.

What we have made as a product

## Medipix 3's unique properties for XRD.

- Extremely stable.
- Extremely reliable
- High count rate linearity per pixel => Extremely high count rate linearity per strip.
- Small pixel size.
- With silicon sensor optimal for use with 8 keV radiation.
- No maintenance needed.
- Very low noise





What we have made as a product

# Systems where Medipix 3 is used



## The collaboration

# Experience/ observations with respect to TT



- In 2000, Technology Transfer at its infancy at CERN
- Collaboration with the Medipix consortium has always been open, pleasant and constructive.
- On site (in Almelo) support by the CERN and NIKHEF team has speeded up the development at Panalytical.
- The collaboration with Nikhef has been, and still is, very strong: several production steps are still performed at Nikhef.
- We like to believe that our involvement has made the Medipix 3 a very successful chip in terms of performance and stability

# Experience/ observations with respect to TT



- Expanded our network:
  - Exchange of knowledge
  - Present during collaboration meetings
  - Found suppliers
  - Co-development
  - Part of large European project
- Not only receive, also give back:
  - Share measurement results
  - Share hardware/software
  - Try to solve problems together
  - Share infrastructure

In development project: timelines are flexible

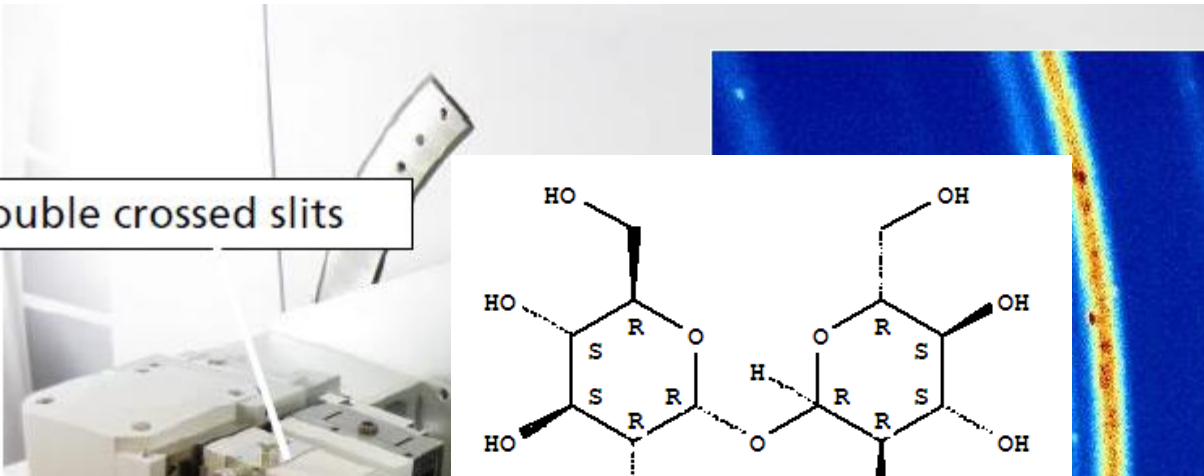
## The future

# The future

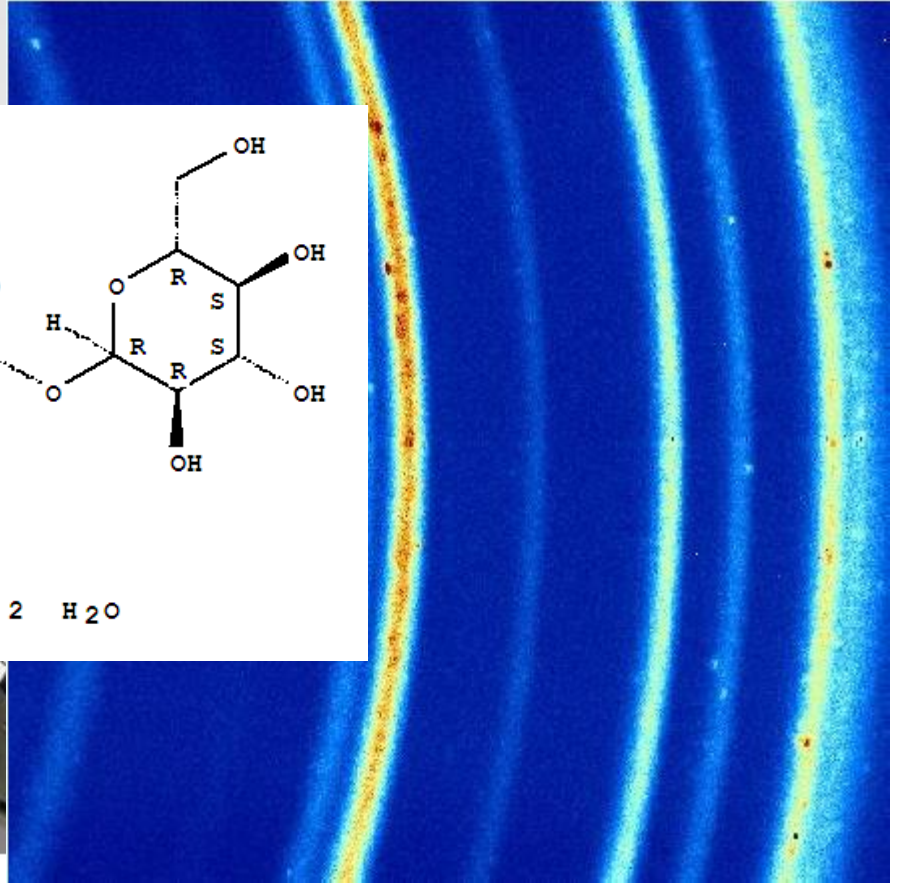
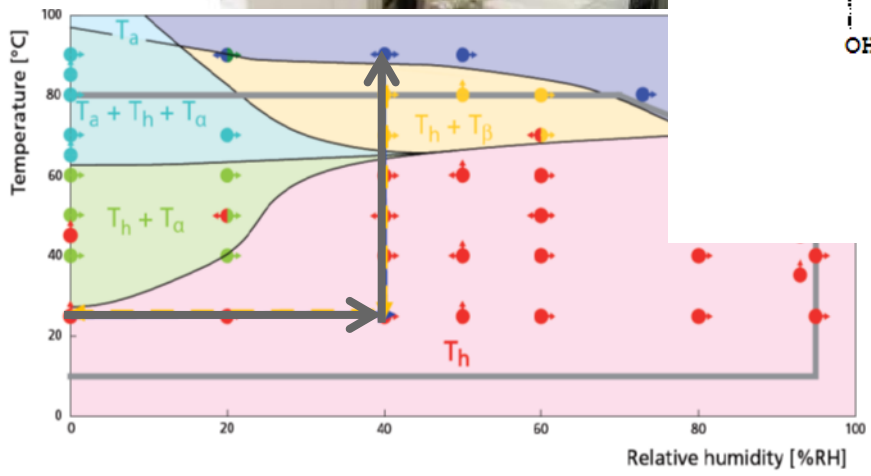
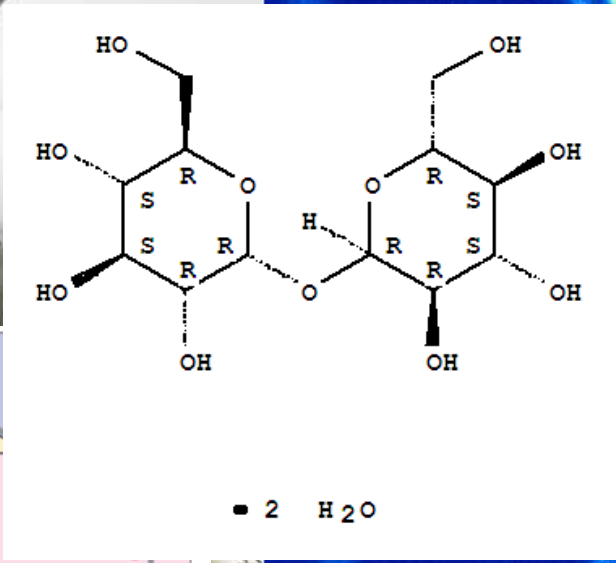


- Medipix 3 will continue to be the “work horse” for XRD for the next years.
- We want to investigate new technology developed at CERN, event driven detectors (Timepix 4):
  - When foton hits a pixel it will send a 64 bit message to the output containing:
    - X, Y position of the pixel
    - Energy of the photon
    - Time of arrival at the pixel (200ps resolution).

# Example: XRD powder trehalose dihydrate



Double crossed slits





Thank you your attention





[www.malvernpanalytical.com](http://www.malvernpanalytical.com)