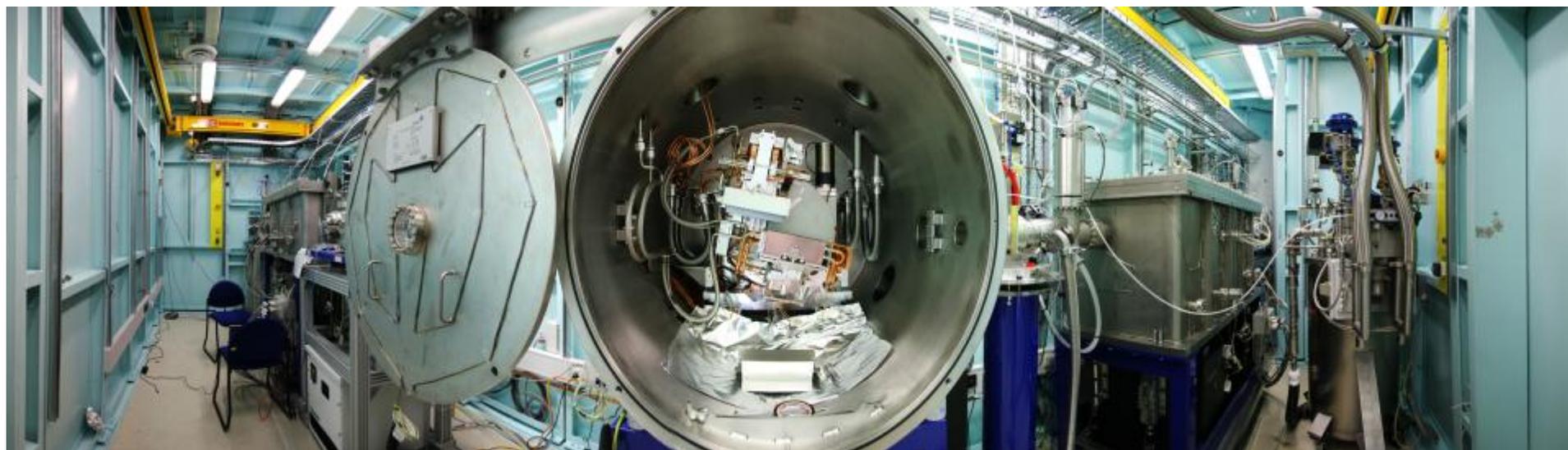


Technology Transfer: Examples and Learning form a Company Working within the Accelerator Community

Wolfgang Diете

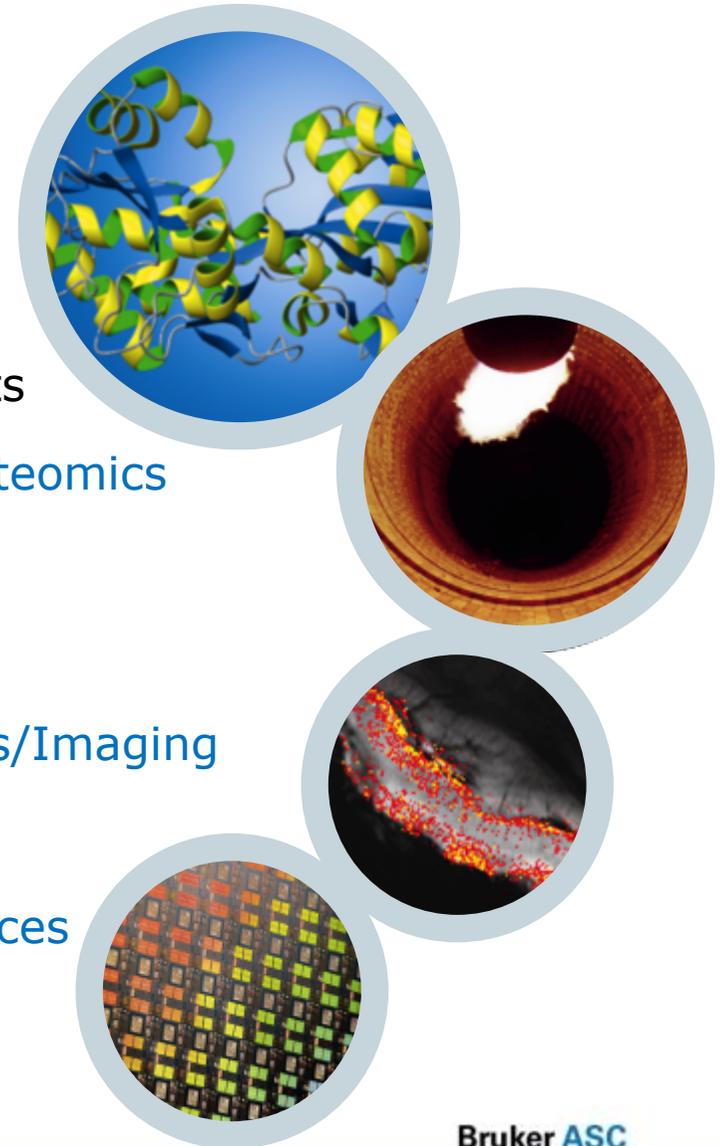
- Introduction
- Examples
- Lessons Learned and Summary



BRUKER - Performance Leader in Life Science and Analytical Systems



- Commitment to innovation, R&D and quality
- Leading market position in key segments
- Synergies in attractive and diversified markets
 - Molecular Research in Chemistry and Proteomics
 - Materials Research and Nanotechnology
 - Applied and Industrial Analysis
 - Clinical Research to Molecular Diagnostics/Imaging
 - CBRNE Detection for Homeland Security
 - HTS Superconductors and Supercon Devices



BRUKER - Performance Leader in Life Science and Analytical Systems



Mass Spectrometer



High Field NMR System



Scanning Probe Microscopy

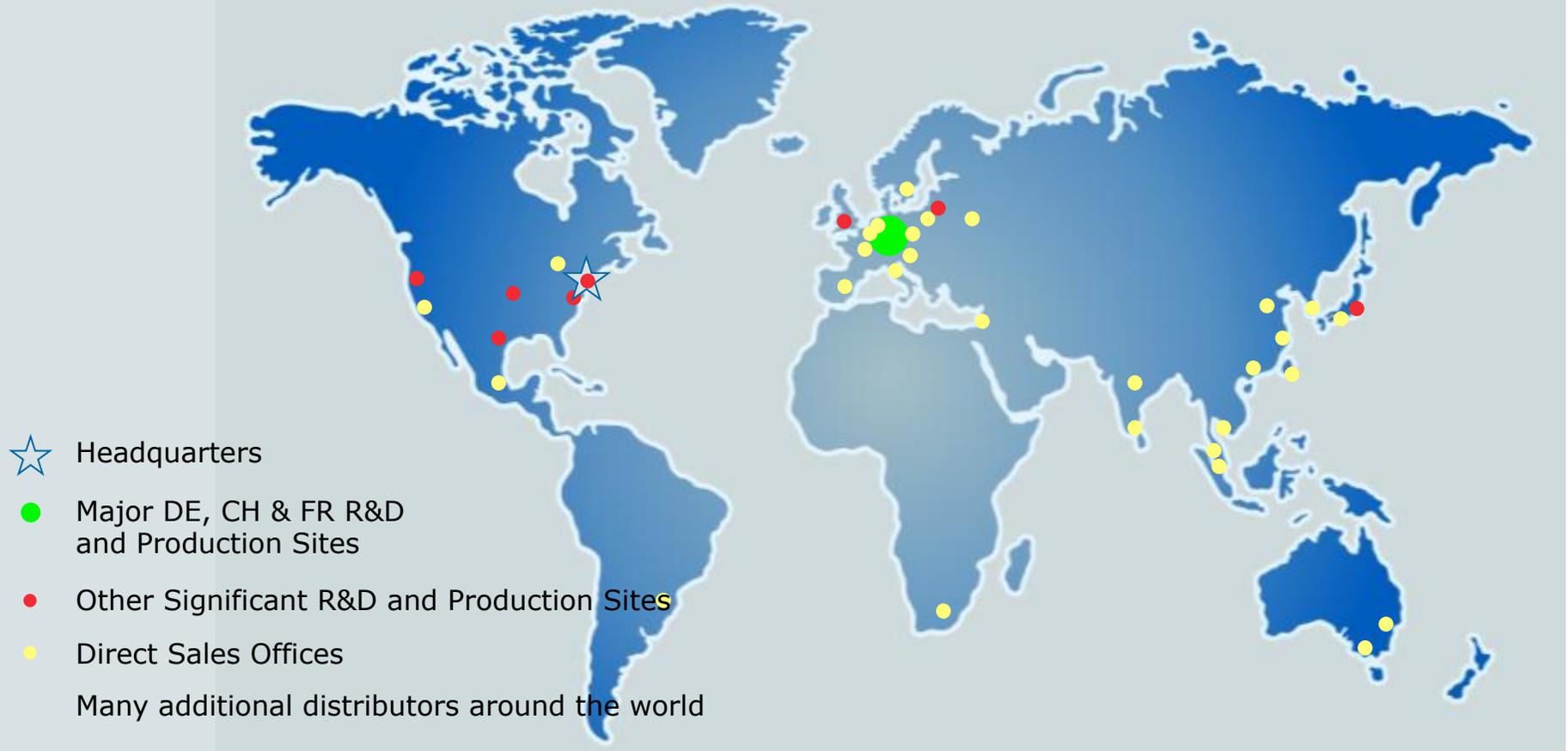


X-ray Diffraction



Analytical Excellence, Long Time Experience and Global Presence

- More than 6200 employees worldwide
- Group Revenue ~ \$ 2 Billion



Synchrotron Beamlines Complete Systems and Components



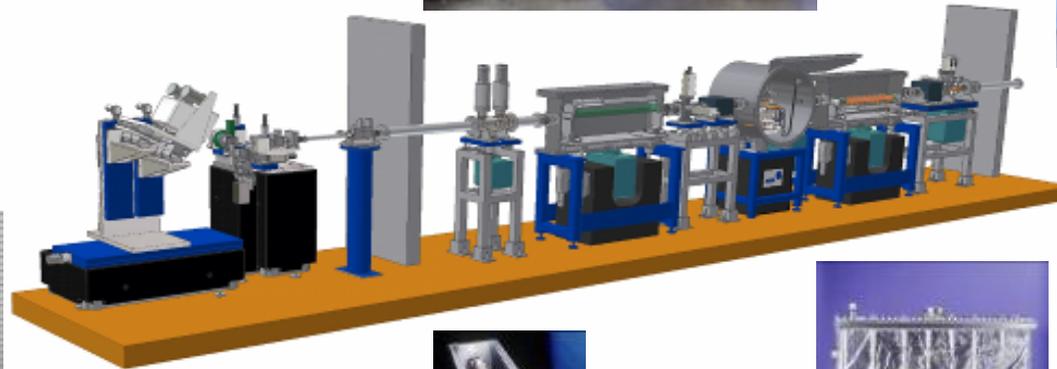
Double Crystal Monochromator



Endstations



Insertion Devices



Mirror Systems





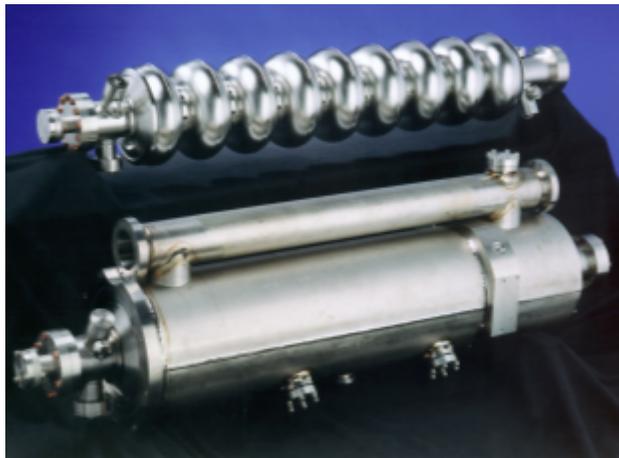
ACCEL Instruments GmbH

**Leading Global Accelerator Equipment and Systems Supplier
for Research, Industry and Health Care**

Started 1995 as a MBO of Siemens/Interatom

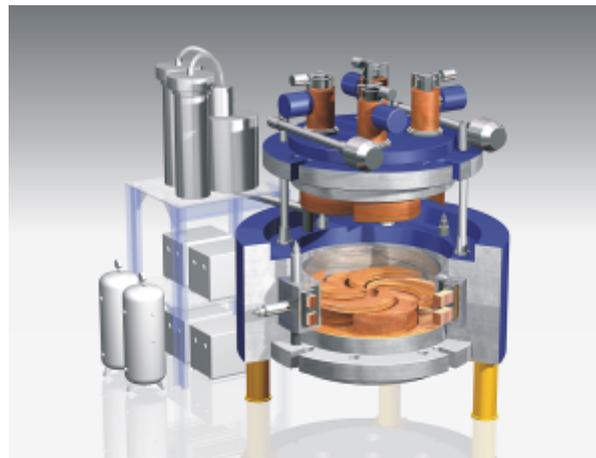
Accelerator Technology

Radio Frequency Systems
Linear Accelerators
Special Manufacturing Projects



Magnet Technology

Superconducting Magnet
Systems
Synchrotrons/Cyclotrons
Particle Therapy



Vacuum, Beamline, X-Ray Optics

Synchrotron Radiation Beamlines
X-ray Optics and Systems
Ultra High Vacuum Systems





ACCEL Instruments GmbH

Leading Global Accelerator Equipment and Systems Supplier for Research, Industry and Health Care

Varian Medical Systems Inc

Accelerator Technology

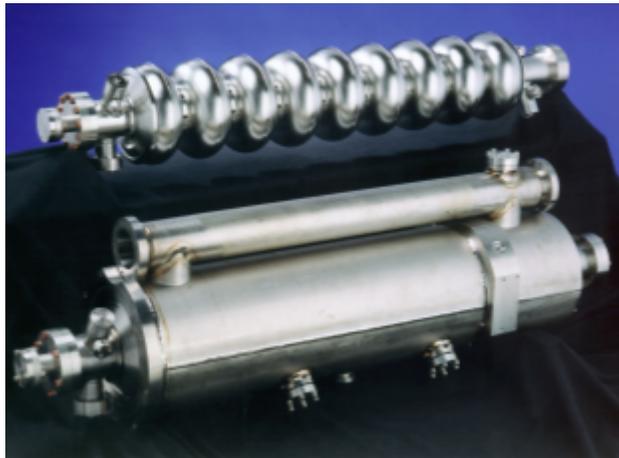
- Radio Frequency Systems
- Linear Accelerators
- Special Manufacturing Projects

Magnet Technology

- Superconducting Magnet Systems
- Synchrotrons/Cyclotrons
- Particle Therapy

Vacuum, Beamline, X-Ray Optics

- Synchrotron Radiation Beamlines
- X-ray Optics and Systems
- Ultra High Vacuum Systems





ACCEL Instruments GmbH

Leading Global Accelerator Equipment and Systems Supplier
for Research, Industry and Health Care

RI Research Instruments GmbH
Bergisch Gladbach

Bruker Advanced Supercon GmbH
Cologne

Accelerator Technology

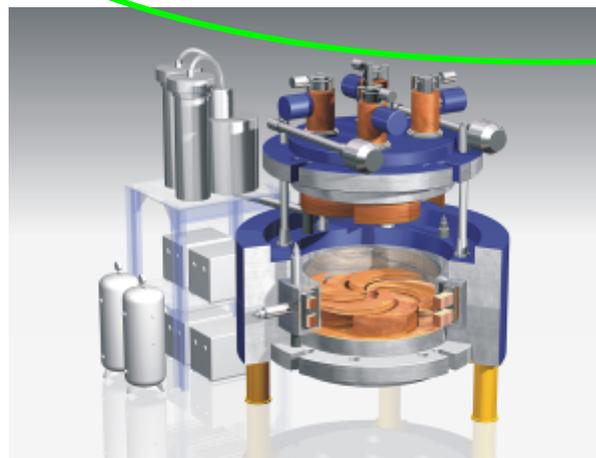
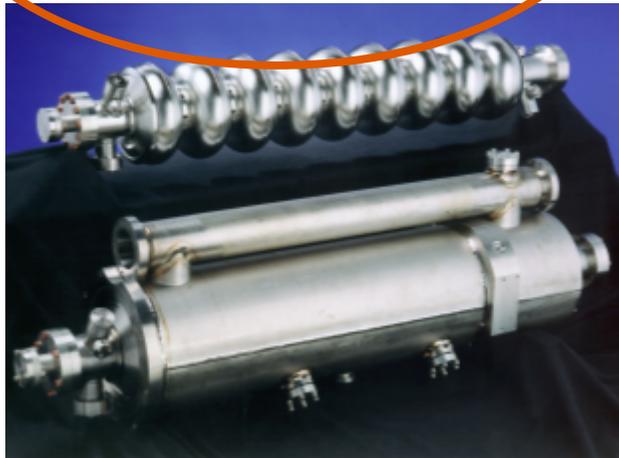
Radio Frequency Systems
Linear Accelerators
Special Manufacturing Projects

Magnet Technology

Superconducting Magnet
Systems
Synchrotrons/Cyclotrons

Vacuum, Beamline, X-Ray Optics

Synchrotron Radiation Beamlines
X-ray Optics and Systems
Ultra High Vacuum Systems





Special Business

- Business is strongly project oriented; typically not products in the typical industrial sense
- Realizing one/first-of-its-kind systems or “copies” with significant improvements
- Therefore we rely co-operation and “technology transfer”, which is realized in many different ways:
 - Education: Specialists and drivers in our fields are coming out of the research facilities
 - Fruitful co-operation within supply contracts realizing state-of-the-art instrumentation
 - License agreements
 - Common R&D projects
 - Consultancy

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Examples

Microdiffractometer for Protein Crystallography Endstation

- System was fully developed at **EMBL Grenoble** in co-operation with **ESRF** and Maatel for the use at ESRF
- “Product” is marketed within a license agreement between EMBLEM and the industrial partners Maatel and Bruker
- About 25 systems installed, covering a large fraction of high-end crystallography endstations worldwide (SLS, APS, ALS, BESSY, CLS, MaxLab, DLS, DESY, ALBA, NSRRC, SSRF, PAL)



EMBLEM
TECHNOLOGY TRANSFER

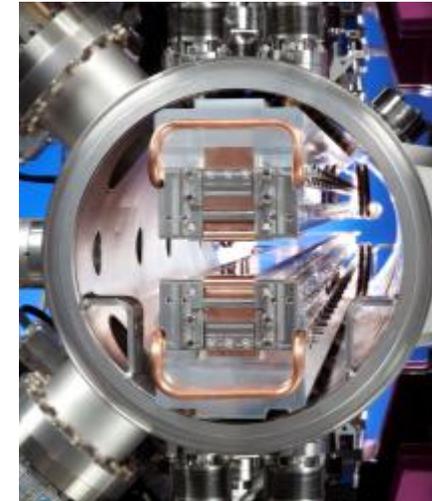


MAATEL
ELECTRONIQUE MEDICALE ET INDUSTRIELLE

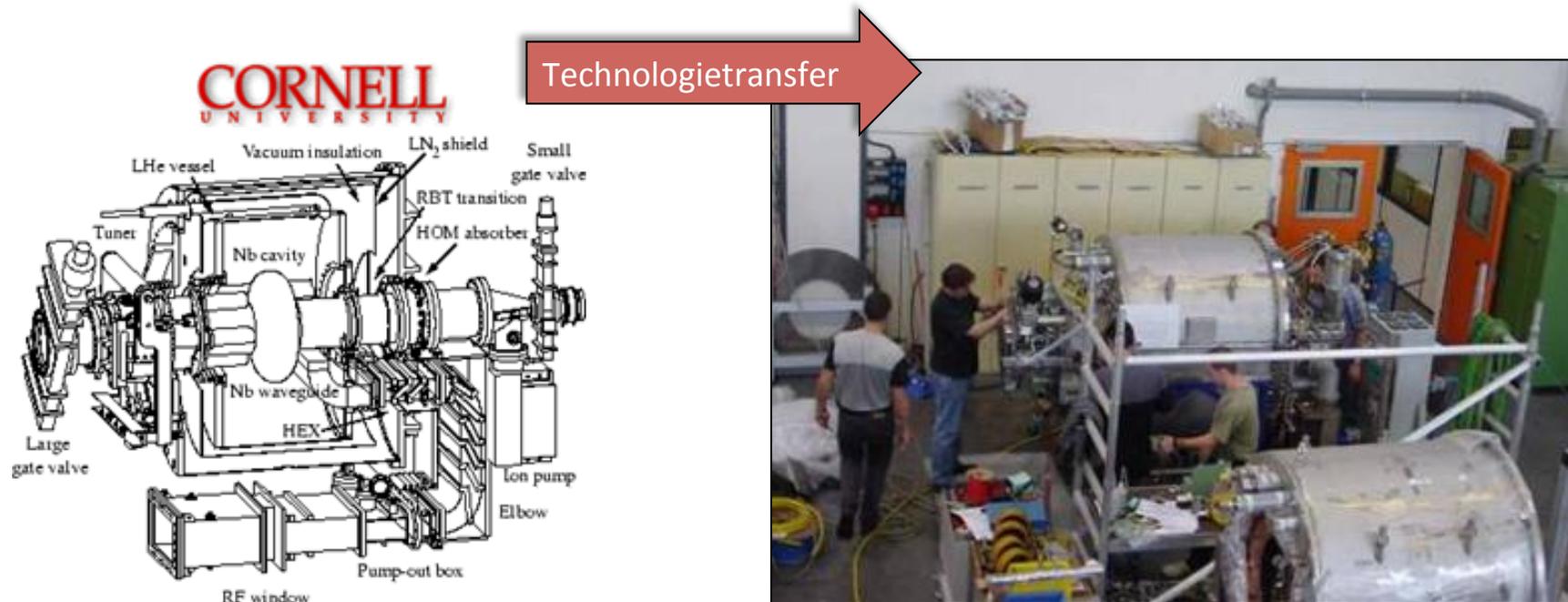
Bruker ASC

Insertion Devices

- License agreement with **ERSF** to apply the ESRF know-how to our products and designs
- Co-operation with Kyma, spin-off from **Elettra** using the know-how of Elettra The Kyma logo, featuring the letters "K" and "Y" in orange, followed by a wavy orange line and a small orange triangle.
- Using the know-how of the research labs allow us to design and build state-of-the-art devices
- Much closer co-operation between industry and research lab in Japan reduces our success for In-vacuum Undulators



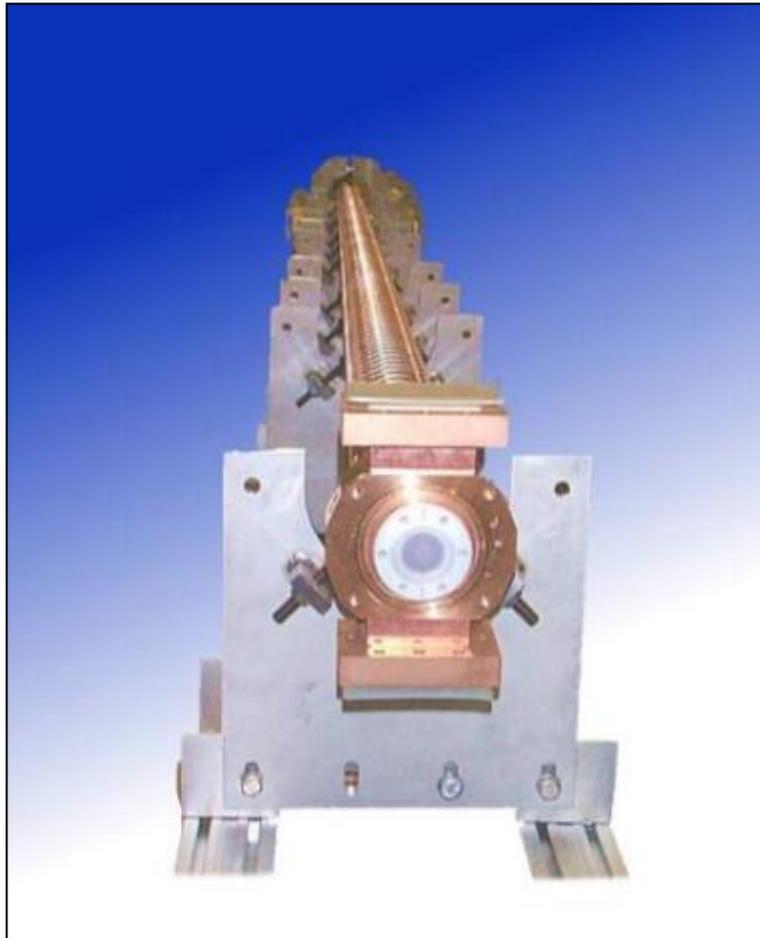
Accelerator module (500 MHz)



Cornell University transferred technology on 500 MHz SRF module to ACCEL

- Technology developed for CESR II.
- NSRRC Taiwan was searching for an industrial partner that could deliver the Cornell modules as a turn key system
- Meanwhile 16 units were produced and installed worldwide (NSRRC, CLS, DLS, SSRF, PAL)

TT and licence agreement with DESY S-Band Structures for injection linacs



Accelerating structures produced by RI

For injection linacs:	12 pcs
For FEL application:	4 pcs
For XFEL MaxLab:	40 pcs under production
For Solaris (Poland)	6 pcs under production



Proton Therapy



License and co-operation agreements:



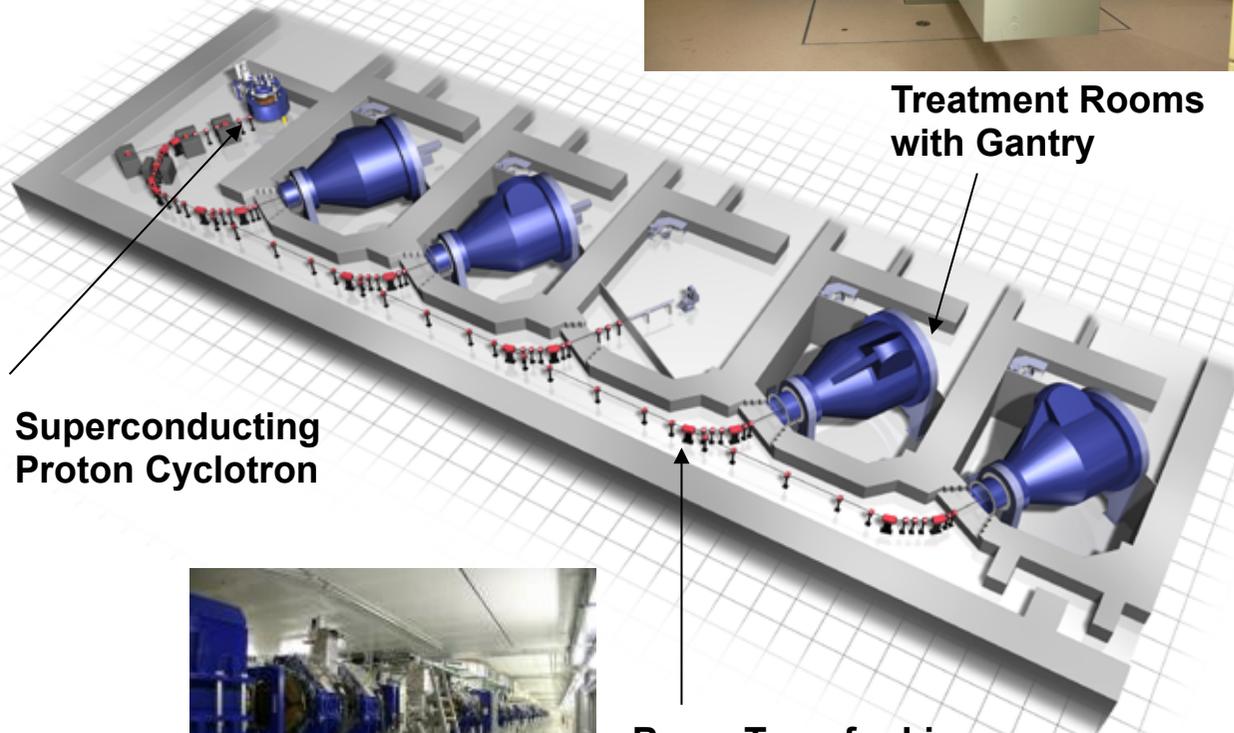
PAUL SCHERRER INSTITUT



LBL Berkeley
HMI Berlin



Treatment Rooms with Gantry

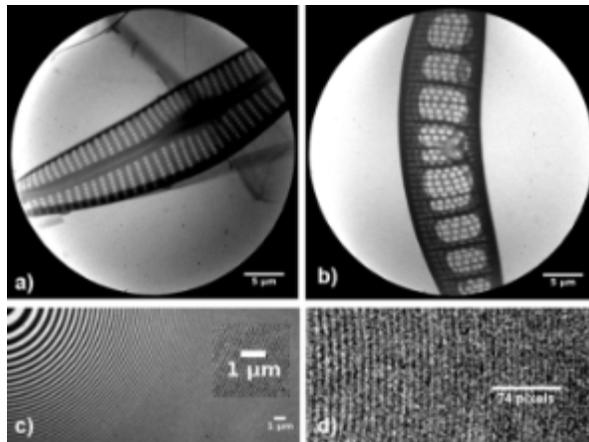
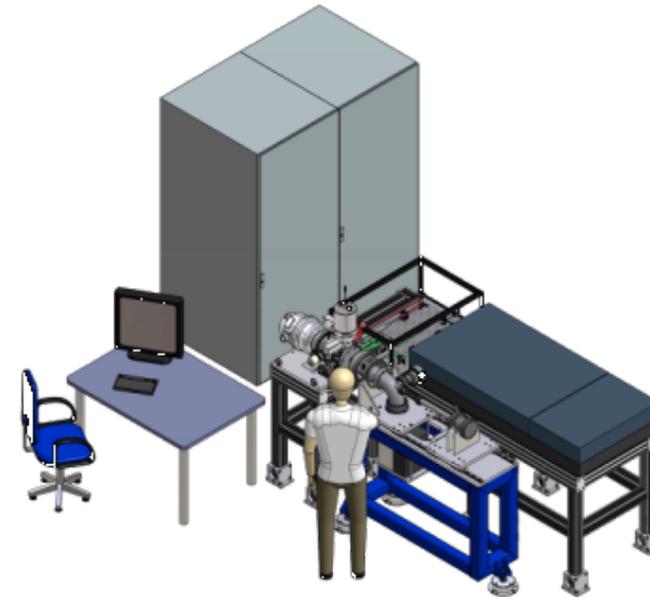


Superconducting Proton Cyclotron

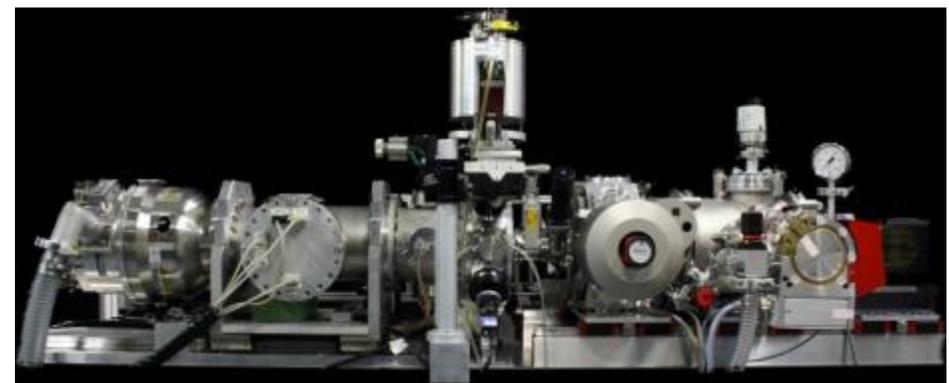
Beam Transfer Line



Water-window X-ray Microscopy Funded R&D Project



Test structures demonstrate resolution below 50 nm with exposure times of 2-3 minutes



Demonstrator installed at TU Berlin / MBI

A former ACCEL Instruments Business

Bruker ASC



Lessons Learned –

Customers are the colleagues in other research facilities worldwide

- With our TT activities we stay in the community, there is basically no application to a wider industrial market
- Established numerous successful co-operations in many different ways, very often just by simple delivery contracts
- Sometimes we act as a kind of a “mediator”
 - Use Know-how from projects realized for or by one lab
 - Re-design using our technological know-how and industrial background
 - Realize new state-of-the-art instruments for another lab
- Models have to be adapted to the specific situation
 - The funding of the colleagues has to pay for the royalties
 - Co-operations between the research institutes can result in a kind of a competition

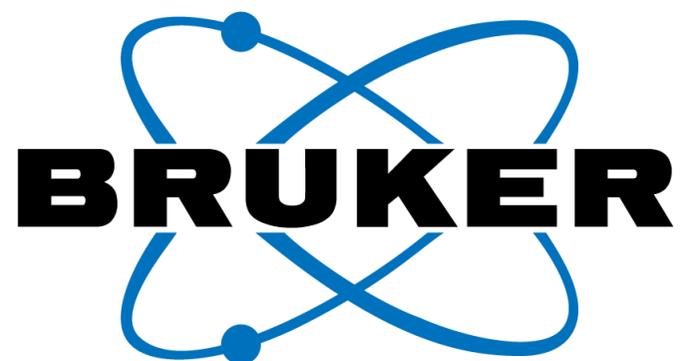


Summary

- Depending on the final definition, you can call our entire business “Technology Transfer”
- ACCEL started with 35 people; now about 350 people are working in three different companies (Bruker ASC, RI and Varian Medical)
- How can such a technology transfer be successful and what is necessary?
 - Understanding of each others situation and goal
 - Good communication
 - Matching the TT model and contract to the situation



Thank you very much for your attention !



wolfgang.diete@bruker-asc.com
www.bruker.com/synchrotron



Bruker ASC, former ACCEL Instruments GmbH

Custom Designed Systems for Research, Industry and Health Care

History

- | | |
|-------------------|---|
| 1980 | Accelerator activities started within a Siemens' nuclear engineering subsidiary near Cologne/Germany |
| 1993/1994 | Management buy-out contract with Siemens
Key staff of 35 joined ACCEL |
| 2007 | ACCEL has grown to leading supplier in special markets with approx. 250 employees |
| Jan. 2007 | Varian Medical Systems, Inc. acquires ACCEL |
| April 2009 | Bruker acquires the Research Instruments Division of ACCEL
Bruker ASC continues the business of Superconducting Devices, Magnet Systems and Beamline & X-Ray Systems |
| Jan 2010 | Bruker ASC acquires assets of AIXUV GmbH |



Series Production Ramp-up and Ramp-Down of a Specialized Facility



ACCEL built 400
LHC SC-Quadrupoles for CERN
Order Vol. \$60m



A former ACCEL Instruments Business

Bruker ASC