



## Welcome to LOT-QuantumDesign Europe



Cracow 2018, Stefan Riesner





## About us

- Presence in 20 European countries
- Part of worldwide Quantum Design network
- Local support and service
- Application centers
- Approx. 140 specialists serving our customers
- Stable company (founded 1970) and many long-serving staff





## Quantum Design – Worldwide

- Member of the Quantum Design group since 2007
- Worldwide distribution network



North & South  
America



Europe



India, China



Japan, Korea,  
South East Asia



## LOT-QuantumDesign – Find us here





## European team selling power

- **Multidisciplinary teams** of scientists and engineers
- **Local sales people** as your contact to handle administration, tenders and translations
- **Experts** provide technical expertise and application support
- **Fast and reliable service** is provided by specialists with scientific/technical background



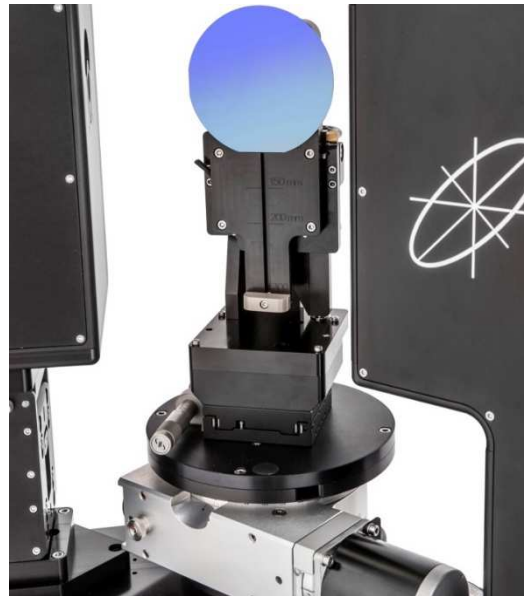
## NEWS – Meet us here...

- “Spectrum“
- Exhibitions & Roadshows
- Newsletters
- Workshops
- [www.lot-qd.com](http://www.lot-qd.com)





## Our product range

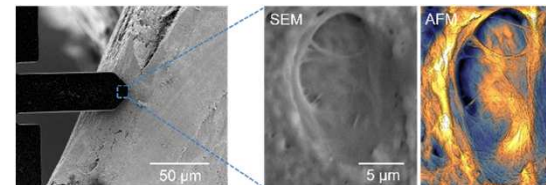


- Electron microscopy
- Cryogenic equipment
- Imaging
- Life sciences
- Light & lasers
- Materials science
- Optics
- Spectroscopy



## Electron microscopy

- Desktop scanning electron microscopes (Phenom)
- In situ stages & TEM sample measurement (DENSsolutions)
- Sputter & carbon coaters (Quorum)
- Cryo preparation system for SEM (Quorum)
- Correlative AFM & SEM (GETec)







## Cryogenic equipment

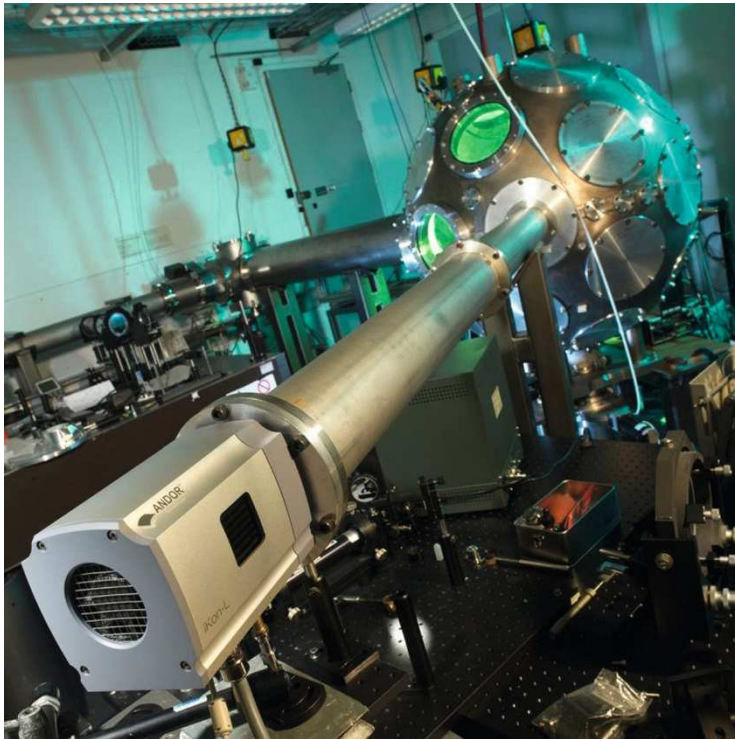


Cryostation by Montana Instruments  
Cryogen-free optical cryostat with low vibrations

- Cryogenic temperature control (Cryocon)
- Ultra-low temperature cryostats (HPD)
- Helium gas purifiers (Quantum Design)
- Helium recovery plant (LOT)
- Laboratory-sized helium liquefiers (Quantum Design)
- Optical cryostats (Montana Instruments + Quantum Design)



## Imaging



- CCD, EMCCD and sCMOS cameras (Andor)
- High & highest speed cameras (AOS Technologies)
- Advanced infrared cameras (Xenics, Infratec)
- Hyperspectral cameras and systems (Specim)
- Imaging spectrographs (Specim)

Andor camera application

# Radiometry



- Radiometers, Photometers and Spectroradiometers
- Flexible light measuring systems
- Detector head allows a custom-designed modular configuration by using special matched filters and input optics.
- Choice of UV radiometers fitting the application
- Two types of spectroradiometers for the range 200 – 1100 nm





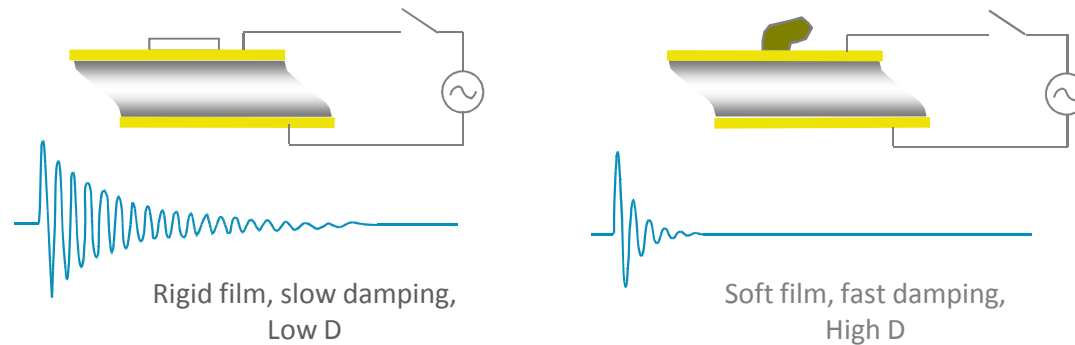
## Life science

- Digital microscope and scanner: OCT (SCREEN)
- Optical tweezers (Aresis)
- QCM-D quartz crystal microbalance to study bio-molecular interactions and adsorption (Q-Sense)
- Surface plasmon spectrometers: SPR (Insplorion, Res-Tec)





## Q-Sense Quartz Crystal Microbalance with Dissipation Monitoring (QCM-D)



$\Delta f$  in principle related to film mass

$\Delta D$  in principle related to film viscoelastic properties



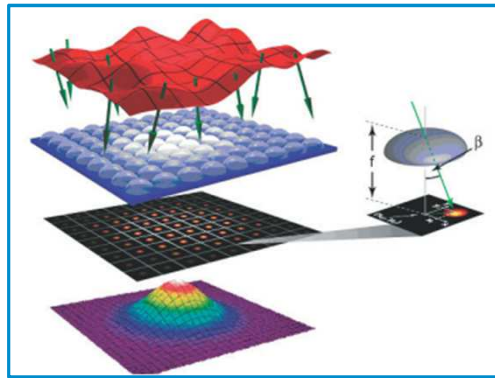
## Analyzing cleaning & degradation





## Light & lasers

- Scientific light sources (LOT)
- Solar simulators (LOT)
- Systems for solar cell characterization (LOT & Bentham)
- Laser power measurements (Macken)
- Laser beam diagnostic (ProOpto)







## Materials science

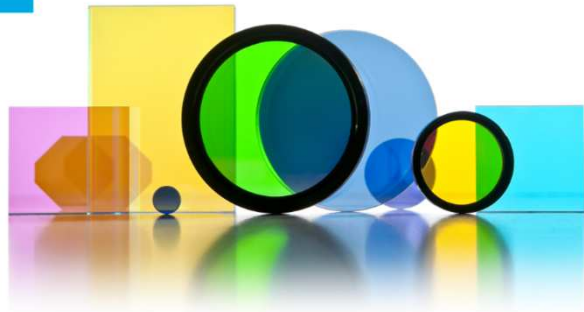
- Analysis of magnetic and other physical properties from mK to 1.000 K. Up to 16 T (Quantum Design)
- Magnetometers (Quantum Design, Microsense)
- MOKE (Durham Magneto Optics)
- Magnetic field platform (Microsense)
- Laser lithography systems (Durham Magneto Optics)
- Particle size analysis (CPS)
- Dip & spin coaters
- Langmuir-Blodgett systems (KSV)



## Materials science

- Spectroscopic ellipsometers – Multilayer thin film measurements (Woollam)
- Nanoindentation – scratch and wear (Micromaterials)
- Thin film stress analysis (Toho)
- Profiler for large-format samples (Toho)





## Optics

- Optical filters from UV to FIR (Andover, Chroma)
- Ultra broadband polarizers and beam splitters (Moxtek)
- Quartz and glass lenses (Stroeher)
- IR optics (Janostech)



## Spectroscopy



- Hyperspectral imaging (Specim)
- Monochromators, detectors & spectrographs (Bentham & Andor)
- FT-IR accessories & sample preparation tools (Specac)



# Departments at LOT Quantum Design GmbH

- Management
- Accounting
- **Product management**
- **Service**
- Marketing
- Warehouse and logistics
- IT
- Facility management
- Apprenticeship
  - E.g. physics laboratory assistants
- Human resources

About 80 employees in Darmstadt



## Product management at a glance

- Technical discussions with potential customers
- Participation in tenders
- Negotiate standard vs. customized products with manufacturers and inhouse planning resources (technicians, application engineers)
- Presentations at road-shows, seminars, exhibitions, ...
- Organize product-related workshops



LOT presence at an exhibition



## Some aspects on product management

### Sell our products

- Commercial and technical discussions with (potential) customers
- Prepare quotations
- Answer technical questions
- Find “ideal” system/product configurations
- Follow ups
- Find new customers
- “Close” the sales file







## Additional duties

- Prepare statistics (e.g. forecasts)
- Organize annual product trainings for our international offices (“satellites”)
- Watch market
- Find suppliers with fascinating new products to add to our product range
- Participate in regular inhouse meetings to exchange info on trade-shows, business strategies, knowledge exchange upon (new) products



## Product management - Quantum Design

- Technical experts in Darmstadt
- Local offices (F, UK, IT, CH)
- Local sales people (**PL**, CZ, ES, Nordic, BeNeLux, TUR, RUS, HU, RO, ....)



Piotr Dluzewski (**Poland**)



Dr. Tobias Adler



David Appel



Dr. Marc Kunzmann





# Quantum Design European Service Center

➤ Technical experts in Darmstadt

Dr. Natalia Tristan



Thomas Beppler



Dr. Oleg Ignatchik



Robert Janz



Konstantin Machold



Joachim Speck



## Service engineers for Quantum Design instruments

- Install new systems at customer sites and provide training
- Failure analysis (by description, remote access, visits, "trial and error", ...)
- Help users repair their systems
  - On their own
  - By visits
  - At our lab in Darmstadt
  - Organize repairs at San Diego headquarters

We first make it shiny...



... check the results ...



... and then implant  
the refurbished unit

## Combine work and leisure activities



Weekend trip during training in San Diego

- Enjoy regular trainings at manufacturer sites e.g. at Quantum Design in San Diego
- Stay in regular contact with manufacturer (e. g. weekly conference calls)
- Negotiate repairs (scenarios, conditions, prices, ....)
- Send parts to manufacturer for repair

# Creation of a spare part catalogue

Service Parts Quantum Design

LOT Quantum Design



Produkte Service Neuigkeiten Über uns

Service / Service Parts Quantum Design

Suchbegriff

### Service Parts Quantum Design

We offer an extensive range of accessories and consumables for your Quantum Design system.  
To receive a quotation, just check for the right part(s) below and fill in the form.

Quantity	Picture	Part number	Part name	Description
MPMS3 General parts				
<input type="text" value="0"/>		QDS-4500-604 (QD-C130A)	MPMS3 Quartz Paddle Sample Holder	<b>Quantity per Order: 1</b> Magnetically clean quartz holder, ideal for samples with small moments. The holder geometry allows placing the samples close to the geometrical center of pickup coil. Flat surface is 4 mm wide, length is ca 152mm.
<input type="text" value="0"/>		QDS-4500-608 (QD-C130B)	MPMS3 Brass Trough Sample Holder	<b>Quantity per Order: 1</b> Commonly used as a robust holder for larger moment samples (usually

Diese Website verwendet Cookies, um Ihnen eine optimale Nutzung unserer Website zu ermöglichen. [Weitere Informationen.](#)

OK

LOT Quantum Design






## Our Territory of responsibility

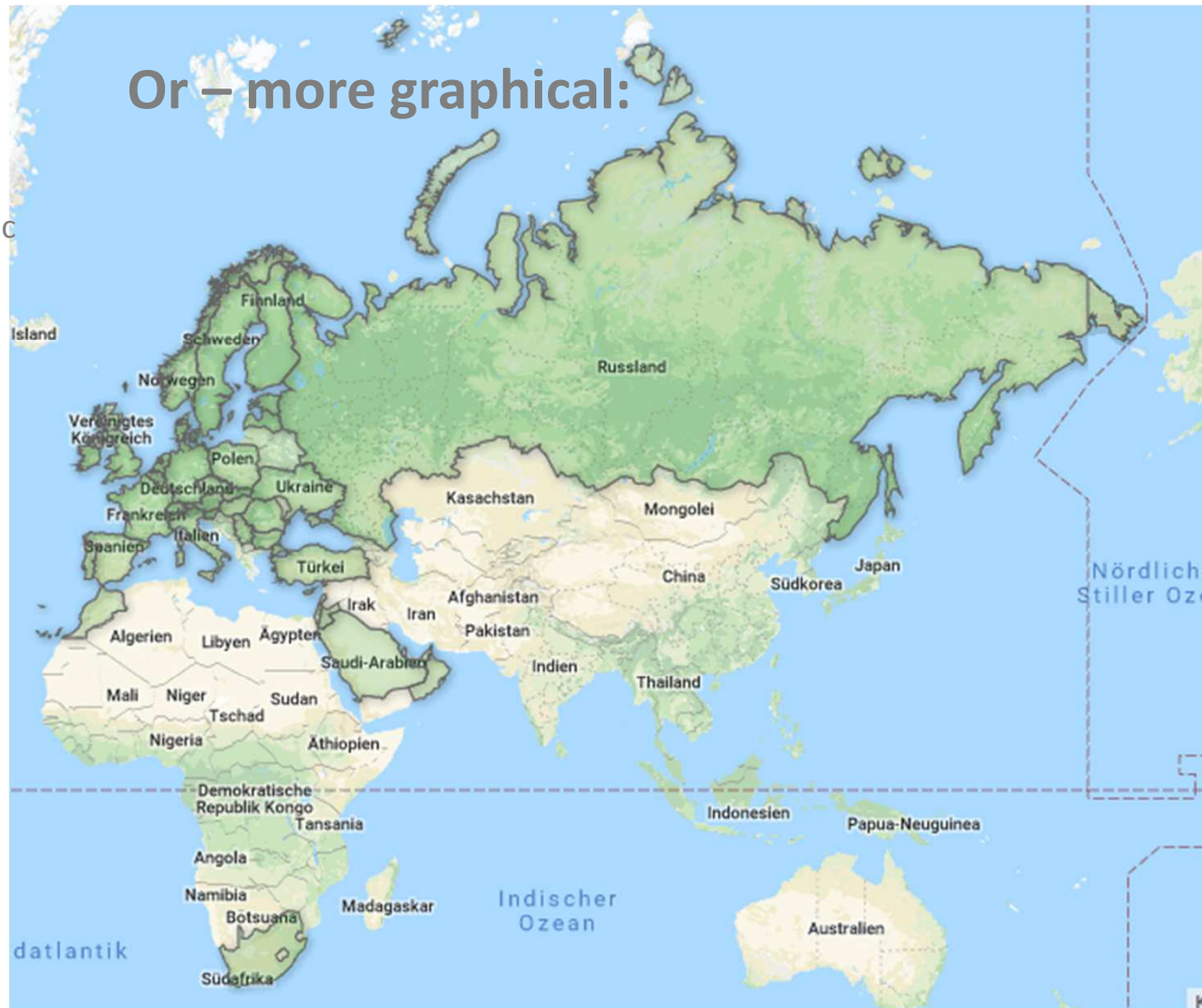
- We support instruments in almost 40 countries
  - Most of them in Europe
    - Majority in EU countries (luckily no customs barriers)
- Service centralized (Darmstadt) regardless of local sales office/person





Or – more graphical:

-  Austria
-  Belgium
-  Bulgaria
-  Cyprus
-  Czech-Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Israel
- Italy
- Jordan
- Katar
- Latvia
- Lebanon
- Morocco



- Netherlands
- Norway
- Oman
- Portugal
- Poland
- Romania
- Russia
- Saudi-Arabia
- Slovakia
- Slovenia
- South-Africa
- Spain
- Sweden
- Switzerland
- Turkey
- United Kingdom
- Ukraine
- United Arab Emirates



## Dealing with different countries

- Find a common language (we support Russian, Polish, English and German). Our written language is English.
- Be aware of cultural differences.
- Most times neither customer nor service engineer speak in their native language – risk of loss of information – sometimes we have to read “between the lines”
- Significant time difference to some of the destinations (like Vladivostok)
  - Can be an issue for installations
- 9 hour time difference between Darmstadt and San Diego.

Aktuelle Uhrzeit San Diego:

Dienstag, 18 September 2018

**04:52:32**

Aktuelle Uhrzeit Deutschland:

Dienstag, 18 September 2018

**13:52:32**



## “Extreme” places

Most eastern QD system: Vladivostok

Most western: LaLaguna (Teneriffe)

Between both systems lie 11400 km

....

Snezinsk ...

Cold: Novosibirsk (-25°C Winter / +25°C Summer), St. Petersburg (most northern Million city of the world) – white nights in June

Hot: Mediterranean countries with possible outside temperatures >40°C

Orient: Oman, Saudi, UAE, ....

La Laguna, Teneriffe



Irkutsk, Epiphany



Palace of his Majesty Sultan Quabus ibn Said, Muscat, Oman



## “Extreme” places



Left: Michael Faraday's lab (19<sup>th</sup> century) in „Faraday Museum“, Royal Institution, London.

Right: Quantum Design SQUID Magnetometer (21<sup>st</sup> century) just opposite Faraday's experimental place

Pictures taken from <http://www.rigb.org/our-history/michael-faraday/magnetic-laboratory>



Service engineers must not fear to approach boxes like this:



and to upgrade, repair, do maintenance or train customers on the instruments



Turn carton content into a PPMS Evercool



Unroll high-pressure flex lines



## Side organisation

We also organize travel details:

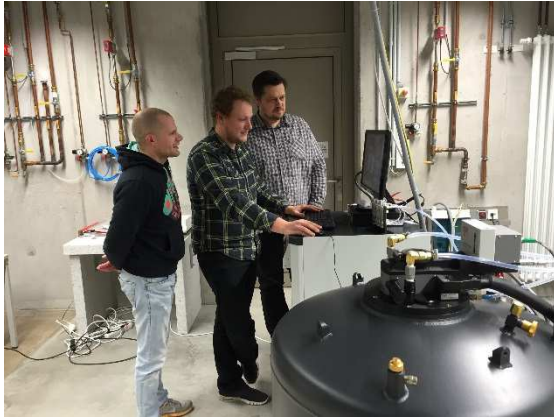
- Transportation to the desired sites
- Find a suitable hotel nearby
- Local transportation
- Visa requirements
- Ship the tool box, ...

A lot of tools must be carried around or sent prior to an installation or service task ...



“Special” logistics of a chiller  
to a user site at >750 km distance

## Being a service engineer also means to see ....



Customer laboratories  
Hotel rooms  
Airports



Moscow, Scheremetjewo



Valencia: The City as a Museum

.... and sometimes have  
enjoyable evenings at foreign  
destinations





## Warehouse planning

- Organize spare parts stock
- Service is rarely a “standard procedure” – cases have individual character

Large components in LOT's warehouse



Small items stock room

## Some fun at work ...



We make it fit ...



We provide birthday gifts...



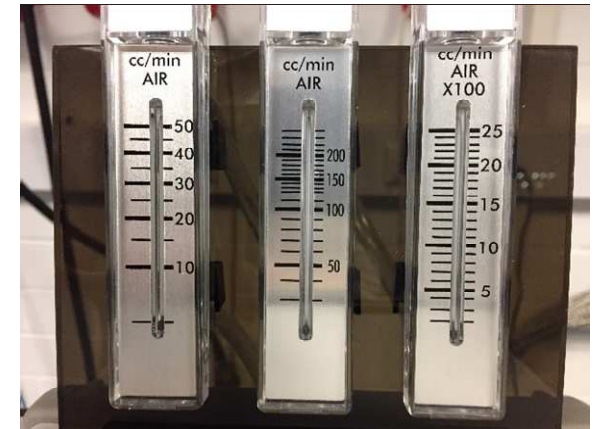
Explore boxes...



We "visit" catacombs...

## Service engineers must have practical skills

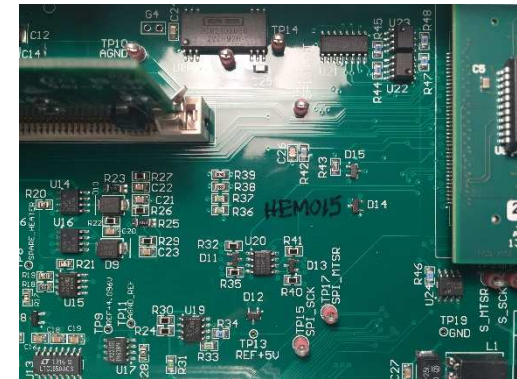
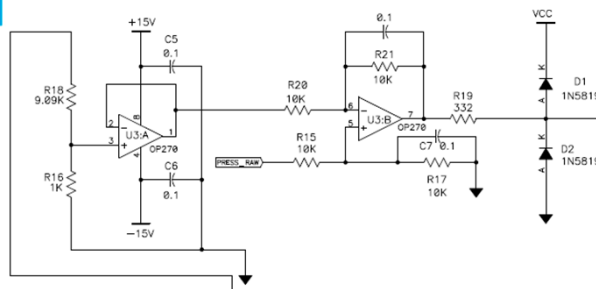
- Helium leak detectors
- Soldering iron
- Oscilloscope
- Residual gas analyzers and a lot more special equipment
- To approach instruments without knowing the manual by heart





## We have to read and understand

- Schematics
- Circuits
- ...



With CAN-based “SQUIDS” (MPMS3) we can easily have 8+ micro processors running on a single machine

Distinguish between different thread types

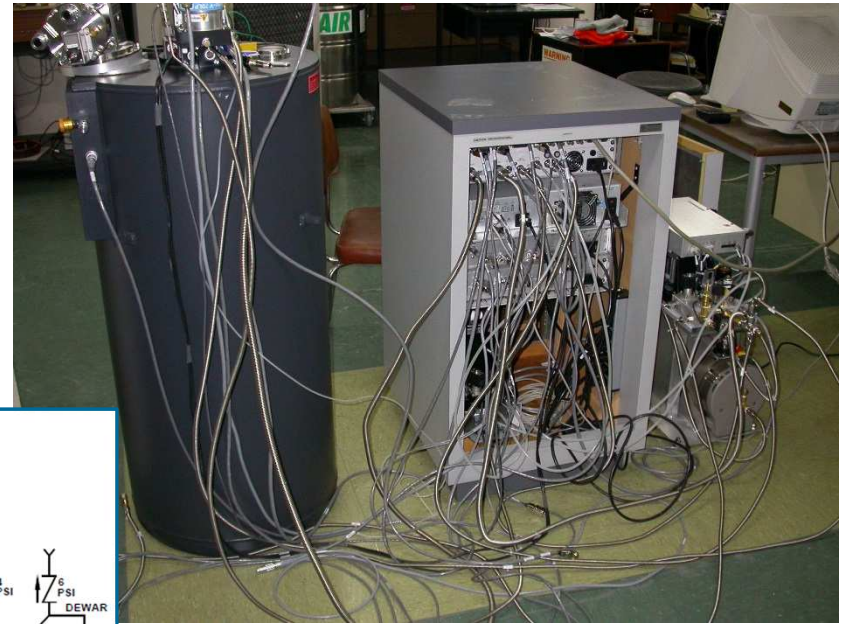
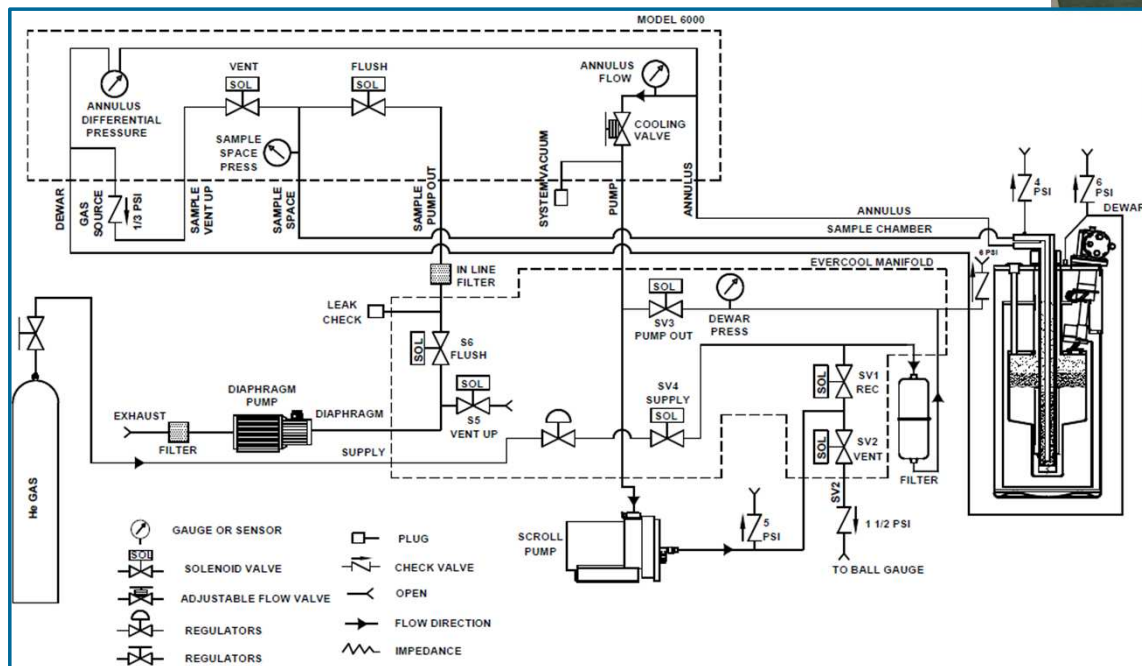


Verify items against specification



# Theory vs. Reality

A gas schematic of a Quantum Design PPMS Evercool



The real PPMS (from behind)

## Our Literature

- Scientific Papers
- Application Notes
- Newsletters
- Service Notes
- Instrument's Manuals

**Light-Induced Excited Spin-State  
[Ir(II)] Chain Compounds**

Chérit Balde,<sup>[a]†</sup> Wolfgang Bauer,<sup>\*</sup>  
Cédric Desplanches,<sup>[a]</sup> Guillaume  
Jean François Létard<sup>[a]‡</sup>

**Keywords:** Polymers / Ir(III) / Spin crossover / P

With the ultimate goal of rationally studying the way to affect the stability of the photoinduced low-spin-selected three ir(III) D4 coordination polymer general formula [Fe(L<sub>1</sub>)L<sub>2</sub>] solvent with L<sub>1</sub>=phthalocyanine(monomethylpyrrole)bis(2,4-pentadienyl)-N,N'-O''-P''-O''-P'' L<sub>2</sub> = 4,4'-bipyridine (bipy), 1-N,N'-diisopropylethylenediamine (dippe), and 1,3-bis(4-pyridyl)propane (ppb), and 1,3-bis(4-pyridyl)propane (ppb), and solvent MeOH. This series of complex 1D chains with structures varying from linear Ir(III)

**Introduction**

Current developments in technology in which assemblies of molecules are used for information storage is an open challenge in coordination chemistry. In this context, molecular bistability, that is, the molecular system to occur in two different states is a particularly interesting property, as logic or memory can be executed.<sup>[1]</sup> In coordination chemistry, a simple example is provided by the spin crossover (SCO) process<sup>[2–6]</sup> which is encountered in some 3d metal heptahedral complexes with d<sup>4–7</sup> electronic configuration display high hysteresis ( $\Delta H^{\ddagger}$ ) low-spin (LS) transition change in temperature or with the application of light, or a high magnetic field. SCO materials are promising to realize excited spin-state trapping (LEST) combine (1) address power (about 10 mW/cm<sup>2</sup>) (2) short addressing time (nanosecond scale), and productivity over successive cycles even in a (3) and (4) optical reversibility, as the LS (A) ground state to reach the SCO material can be reached by green light and back conversion to the LS state is achieved with red light. The main limitation con-

**References**

[a] CNRS, Université de Bordeaux, CMCR, F-33083 Mérignac Cedex, France; E-mail: letard@cimcr.bordeaux.cnrs.fr  
[b] Inorganic Chemistry II, Universität Bayreuth, Germany; E-mail: wolgobauer@uni-bayreuth.de  
[c] Physico-Chimie Labo Chimie des Matériaux et Physique des Solides (LCPM) Université de Ziguinchor, Senegal; E-mail: ziguinchor, Senegal

**DOI: 10.1002/ange.201912422**

# Application Spring 2015


## ATL Medium Pressure Recovery Systems - New

The underlying demand for liquid helium systems, or recover and recycle the helium, is a long term solution, especially for the Cryogenic-free systems are expensive working condition. Traditional helium is due to the industrial size of traditional Liquefiers (ATL) and recovery tech-


The ATL liquefier is designed and the knowledge in low temperature insulate helium storage tank, and the ATL helium transfer at <https://youpi.com> the ATL is proportional to the pressure to the ATL at elevated pressure (although this rate is also affected).

There are three recovery plant can be most basic and the easiest to implement from 60% to 80%. To capture at the Pressure Recovery (MPR) or High Pressure Recovery (HPR) system.

Compared to a HPR plant which is a compressor (up to 2500 psi), and as smaller footprint, lower pressure requirements for additional helium with greater than 90% efficiency, instruments. The HPR system has subcomponents pressure and users to manage due to total contamination in the ATL liquefier.



Quantum Design



**PPMS**  
Pump & Power Management Systems


## Dynacool Tip Seal Replacement and Service

Before beginning it is important that you have the correct type of tip seal. Using the wrong tip seal will result in poor performance and could damage the pump. The tip seals are available in the Dynacool Tip Seal Replacement kit.

**Replacement Kit Part Number:**  
**Tip Seal Part Number:**

1. Warm up the Dynacool system
  - a. Press the warm up system button on the front panel.
  - b. Shut down the computer and power down the system.
2. Remove the Scroll pump from the System Cabinet
  - a. Remove the lower front panel and lower and loosening the tabs out of the slot at the bottom of the scroll pump.
  - b. Unplug the power cord from the pump and remove the pump exhaust filter assembly located on the side of the pump housing in the figure below.
  - c. Remove the 4 1/4-20 x 5/8" bolts holding the scroll pump to the cabinet.
3. Replace the tip seals.
  - a. With the pump on a bench, follow the instructions in the hours the pump has been run. The tip seals are replaced to predict when future tip seals will need to be replaced.
4. Clean out the particulate filter. The particulate filter is located on the scroll pump.
  - a. Remove the two hex socket screws from the filter.
  - b. Pull the filter bottom off (step 2) while the pump is running.
  - c. Empty out the filter bottom and wipe clean the filter.
  - d. Examine the radial O-ring on the trap top. Replace the O-ring with the correct O-ring replacement in the kit. Apply a small amount of oil to the O-ring.
  - e. Press the filter bottom back in place and secure with the two hex screws.
5. Reinstall the pump into the System cabinet
  - a. Place the pump back on the 4 vibration mounts.
  - b. Re-connect the pump inlet hose to the pump.
  - c. Re-connect the exhaust filter assembly by the VCO nut should be turned 1/8 of a turn.

Quantum Design



*PPMS Application Note 1085-156*

**PPMS Vertical Puck**




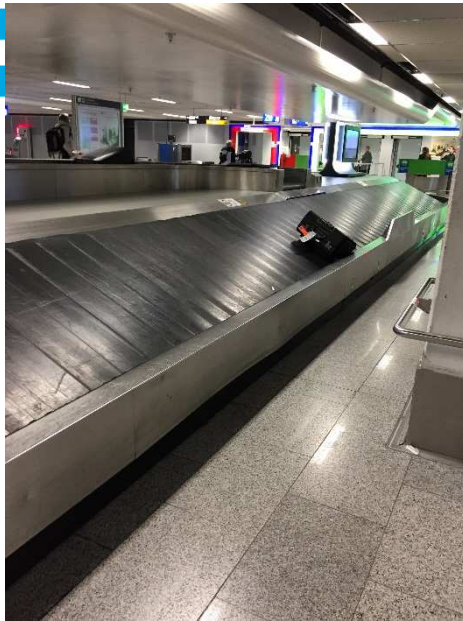
Figure 1. PPMS vertical puck and a Heat Capacity puck

The vertical puck adapter for the vertical orientation. This can be anisotropic materials performed platform holding a plate-like sample if there is both strong sample (either due to shape or magnetowires of the Heat Capacity puck the sample is placed 4.0 cm above magnetic field, thus greatly reducing. This is mainly important in the low



## What we have to accomodate with

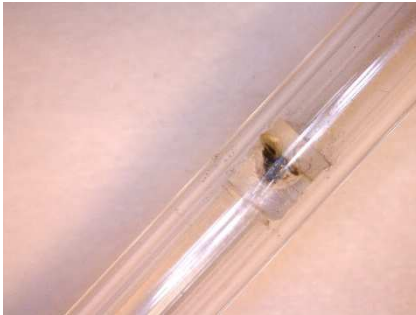
- Travel load
- Advance planning – more or less time to do so.
- Arrangement of in-time delivery of spares / tools
- Customs barriers to be overcome with goods
- Acquisition of visa to certain countries
- Currency
- Jet-lag, time, climate
- Cultural differences
- Different food



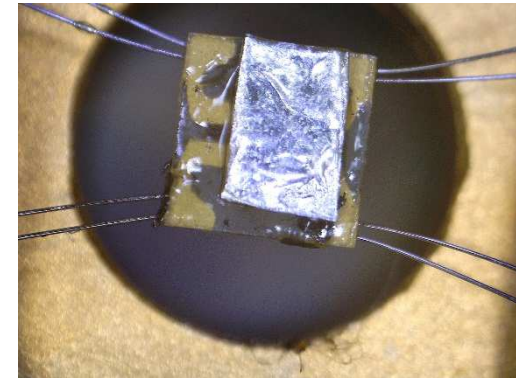


## Application engineer

- Tasks beyond service issues
- Support of (future) users to get the best possible data
  - Sample mounting, routine writing, data interpretation, setting ideal parameters for measurements, ....
- Provide user training to operators
  - E.g. on-site, inhouse workshops, remote sessions, ....
- Support new operators
- Bring challenging instruments to its utmost limits



Sample in quartz bucket for magneto-optic experiment



Sample on sapphire platform for Cp



## Staying „up-to-date“

- Take trainings at manufacturer sites – Cooperate with the manufacturer's application team



- Support sales with “special-solutions”
- Take care of demo laboratory
  - Help establish contact with potential customers
  - Offer service measurements
- Be aware of new applications
- Serve as speaker during workshops
- Help understand weird phenomena (true physics, system artefacts, ... )

## Impressions from social events



Tree climbing parcour

Take a walk from Asia to Europe

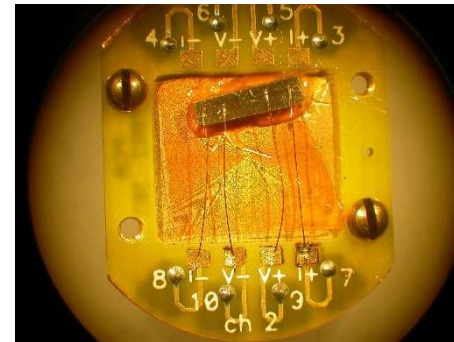


The tour bus in Ekaterinburg

## Application skills

- Laboratory
- Electronic
- Didactic
- Physics

Movie: Vibrating Sample Magnetometer: Powder Capsule filling



Electrical preparation (wire bonding) of sample to be measured down to 350 mK ( $^3\text{He}$ -Option)

# Programming / Scripting

Measurement scripts to enhance functionality of system, e.g. embedding third party hardware

Using of Microcontrollers to aid special measurements

```
math_example (macro) - MultiVu Scripting [design]
Object: (General) Proc: WriteMap
1 '#Language "VBA-COM"

Option Explicit
Dim Map21Answer As String
Dim Map22Answer As String
Dim Map24String As String
Dim PPMSReply As String

Sub acquireMap21
    PPMS.GetPpmsData(2097152, Map21Answer, 1, 0, 0) ' 2 to the
    Debug.Print Map21Answer
    'strip answer from Flag & Timestamp:
    'Map21Answer = Split(Map21Answer, ",") (2) ' First(0) paramte
    Debug.Print Map21Answer
End Sub

WriteMap
```

Parameter requires an expression. 29

```
RGB_LEDs_Relais_VoltageReading_5j | Arduino 1.8.1
Datei Bearbeiten Sketch Werkzeuge Hilfe

RGB_LEDs_Relais_VoltageReading_5j
397 void ch1_polarity_normal ()
398 {
399   digitalWrite(Rel_1_1, HIGH); // sets bank 1, relay 1 on
400   delay(.5);
401   digitalWrite(Rel_1_2, HIGH); // sets bank 1, relay 2 on
402   //suggest GREEN for LED
403   P1 = false;
404   LED1color();
405 }
406
407 void ch2_polarity_normal ()
408 {
409   digitalWrite(Rel_2_1, HIGH); // sets bank 2, relay 1 on
410   delay(.5);
411   digitalWrite(Rel_2_2, HIGH); // sets bank 2, relay 2 on
412 }

Arduino/Genuino Mega or Mega 2560, ATmega2560 (Mega 2560) auf COM20
```

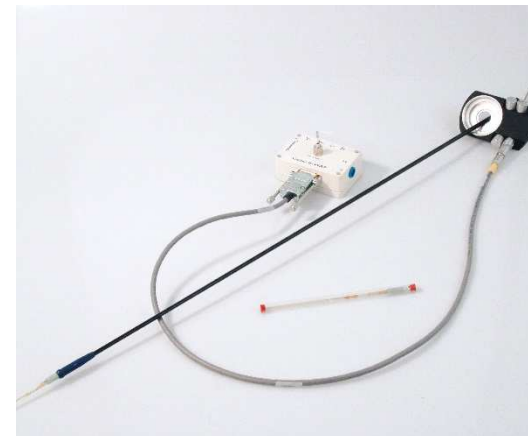
## Chance to implement own ideas



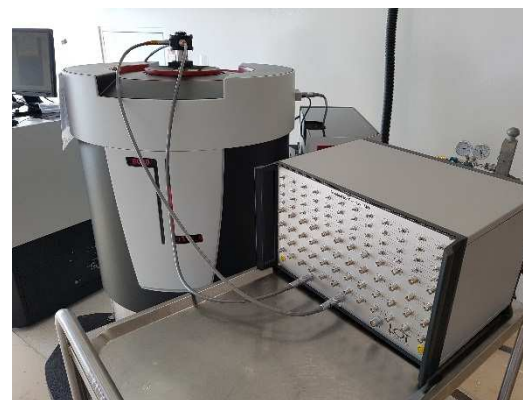
SQUID magnetometer MPMS3 with tunable light source

- Xe bulb with automated monochromator
- Investigate light induced magnetism

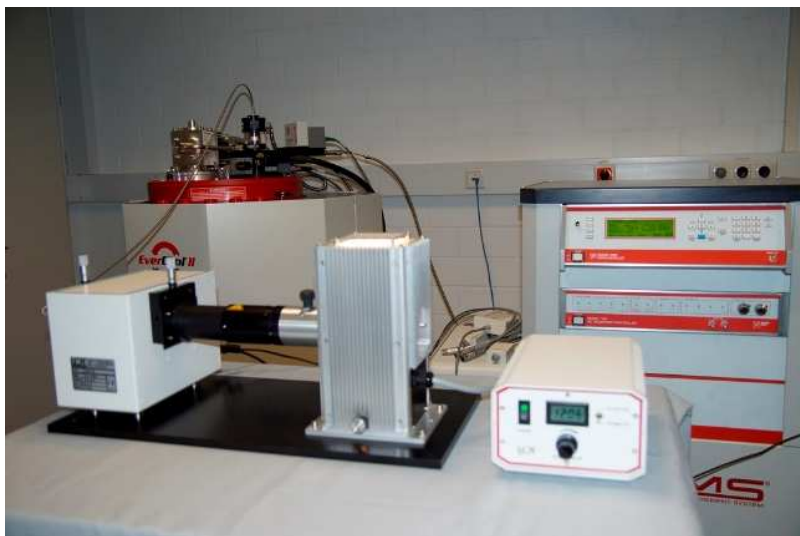
Electro-probe to perform 4 (or 5) wire experiment in cryo + B-field environment



Special setup reaching into cryostat by 48 wires – keeping capability to reach 1.8 Kelvin



## We also bring light to our magnetic instruments



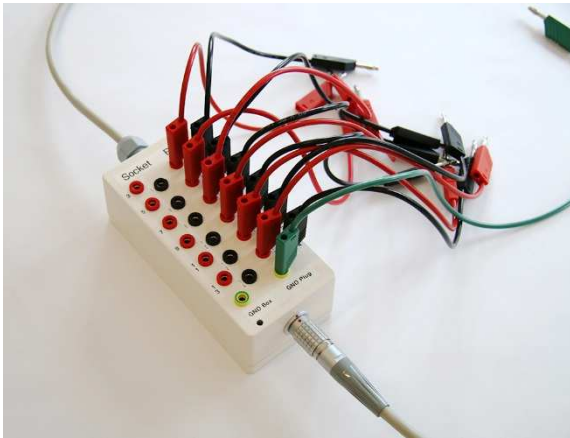
Halogen lamp and motorised monochromator in front of a Quantum Design PPMS



Illuminated sample mounted to MFP ready to go for variable magnetic field and temperature



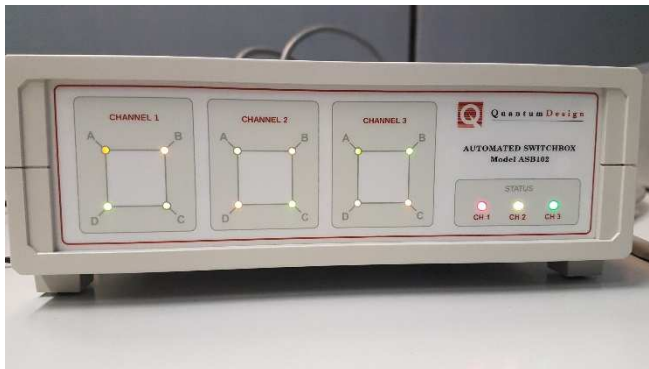
## Making life of operators easier



Manually operated permutation box for cryo-transport experiments (Hall, Van der Pauw, ...)



Scanner box



Also available as fully automated and software-controlled



## All LOT employees have to go through:

- Inhouse organized training and audits on import-export regulations
- Training for „car driving safety“
- Yearly training on general safety regulations
- Training on customs and warehouse regulations
- Training on software e.g. CRM, booking system, travel expenses, ...
- ISO 9001 compliance trainings and audits







## Summary

- A job at LOT has many facets
- Many different experts work together hand in hand
- Balance of challenges and risks
- Stay linked to state-of-the-art science and the scientists doing this cool stuff
- Be open for travelling across Europe and beyond. This is not a (boring) 9-to-5-job
- Communication is important (written, phone) – thorough listening required
- The award is being in contact with a variety of people, cultures, countries, and cities
- Long lasting relationships with customers are common

Stefan Riesner  
riesner@lot-qd.de

Thank You !

