



HZB Mission – Large Scale Facilities, Materials and Energy



One Center – Two Sources



Science with Neutrons
Berlin-Wannsee



Solar Energy



Science with Photons
Berlin-Adlershof



Key Numbers



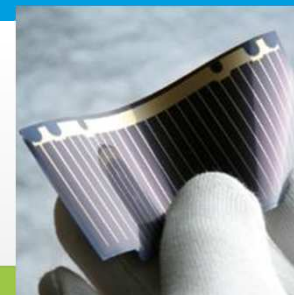
Neutrons



Photons



User Service



Solar Energy

Total Annual Budget: ~110 million EUR

75% ↘ 70% (2015)

25%

↗ 30% (2015)

Total Staff: about 1,100

Scientists: about 400

International Users: about 2,800 p.a.

400

2,400

Mission

We provide **Photon** and **Neutron Radiation** for Science

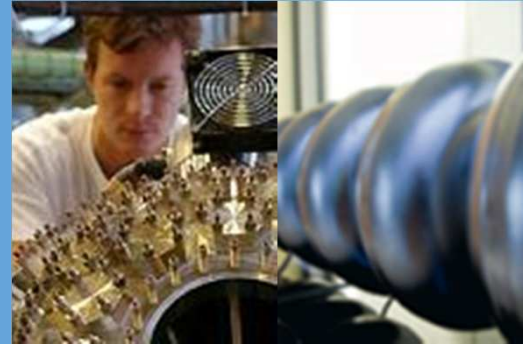
We supply **User Service** for International Users

We conduct Outstanding **Research** in **Matter** and **Solar Energy**

We encourage **Scientific Careers**

We are a **Reliable Partner** in
Scientific Networks and in **International Collaborations**

Science with Photons – The BESSY II Source





BESSY II 3rd Generation Photon Source



- Operational since 1998
- Energy Range from THz to Hard-X-Ray
- **Dedicated to VUV and Soft-X-Ray**
- **Full Polarization Control**
- **Topping-Up** Mode since October 2012
- HOM damped cavities: 2/4 installed
- Solid State Transmitter ordered; delivery starts in Nov 2013

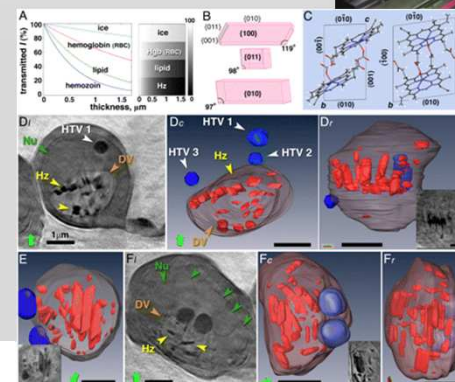
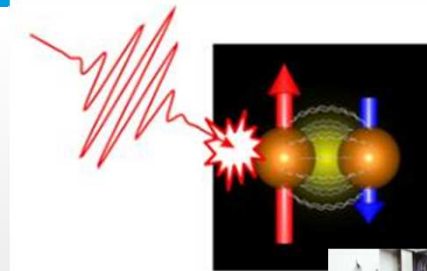




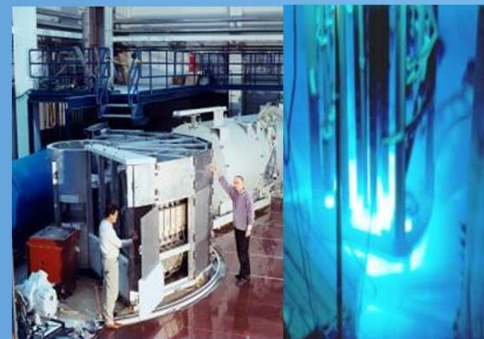
Instrumentation - Some Examples -



- **Femto-second Slicing Source**
 - 100 fs pulses
- **Macromolecular Crystallography Lab**
 - fully automated analysis
 - recently, 1,000 submission to PDB
- **X-Ray Microscope**
 - 11 nm resolution



Science with Neutrons – The BER II Source





Neutron Source BER II



- **Operational since 1991**
- **Medium Neutron Flux**
- **Low Noise of Neutron Radiation → High Quality**
- **Upgrade in 2011**
 - **Cold Neutron Source and Neutron Guide optimized**
 - **Increased Neutron Flux by Factor of 10 at Experimental Site**

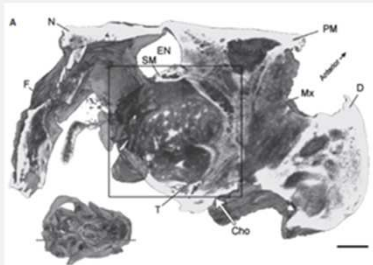




Instrumentation



Neutron Tomography - Paleontology



Laaß, M. et al., Acta Zoologica, 92, 2011

Autoradiography - Arts



Map

Vermeer: *Woman with a pearl necklace* (1665)
Collaboration Gemäldegalerie Staatliche Museen, Berlin



Solar Energy Research

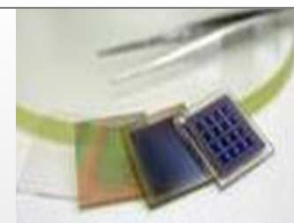




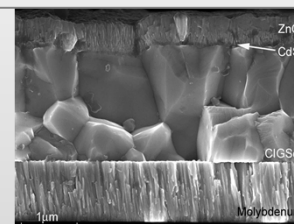
Solar Energy Research at HZB



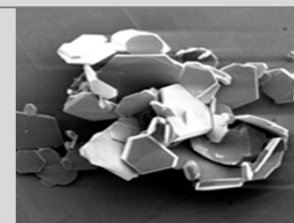
Thin Film Silicon Solar Cells



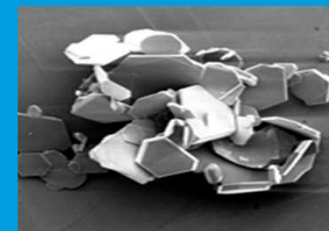
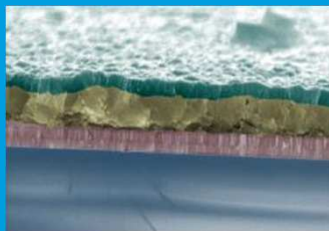
Thin Film Compound Semiconductor Solar Cells



Solar Fuels



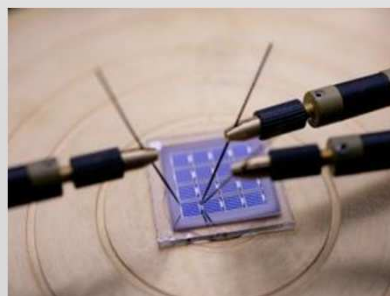
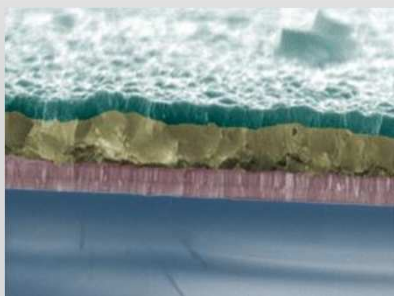
Research Chain



Basics

Development

Technology
Transfer

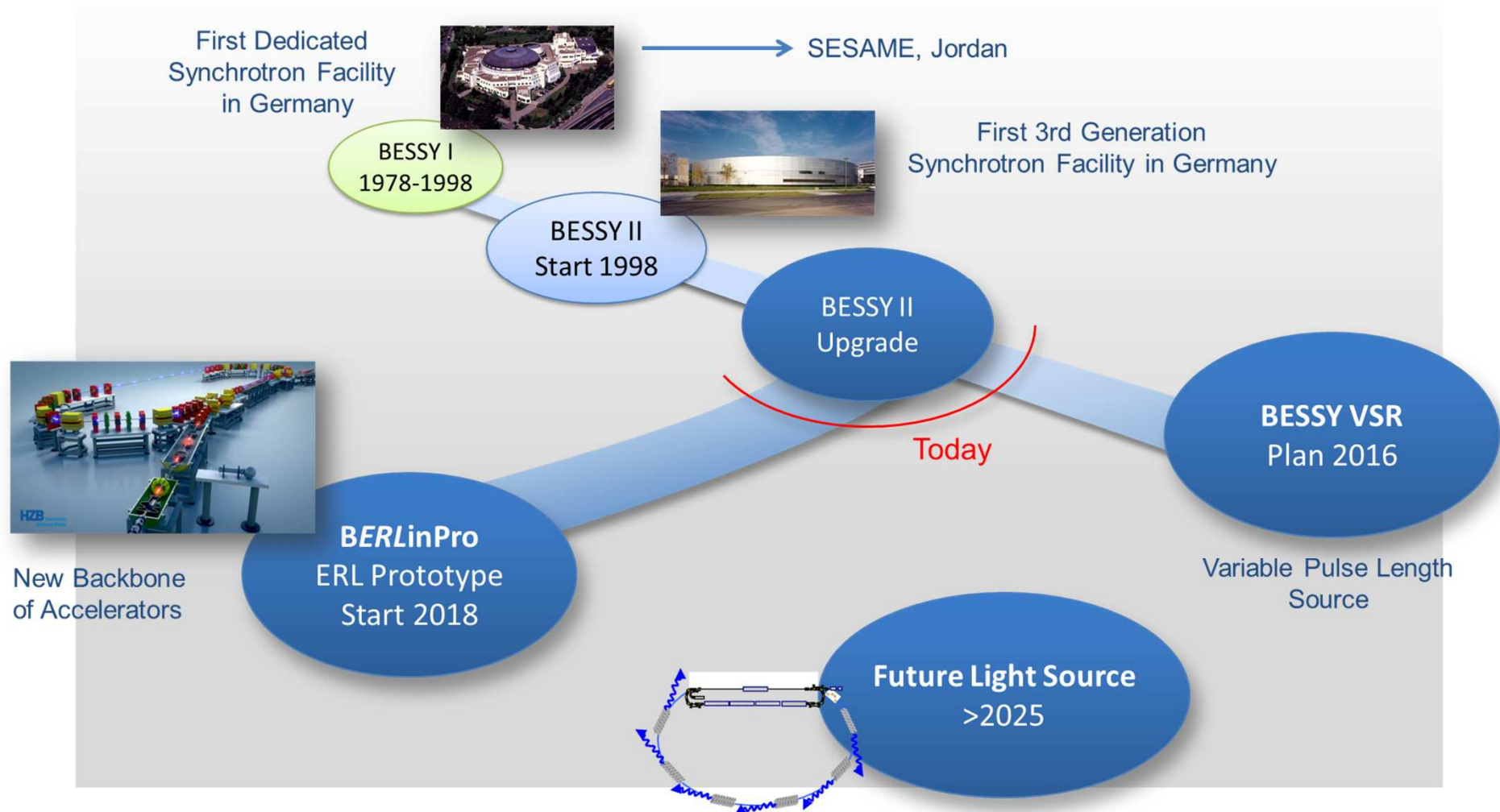




FUTURE TECHNOLOGY FOR RESEARCH



Development of Photon Source





BERLinPro



- **Study for Energy Recovery Linac (ERL)**
- **Operational: 2018**
- **Future Backbone of Modern Accelerator Facilities**
- **Superconducting RF-Technology for all components**
- **Feature:**
 - **High intensity, short pulses of photon beam**



Head of Project: A. Jankowiak and J. Knobloch



Analytics



- **„New „Energy Material In-Situ Laboratory“ – EMIL**
 - **Operational: 2015**
 - **Start of Building Construction: August 2013**
 - **Advanced Analytics of Materials for Energy-Research at the Synchrotron BESSY II**
 - **Photovoltaic Systems**
 - **Catalytic Systems**

Head of Project: K. Lips



© hammeskrause architekten



Knowledge and Technology Transfer



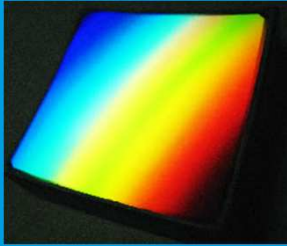


PVcomB

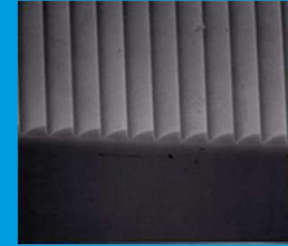


- **Competence Center Thin-Film- and Nanotechnology for Photovoltaics Berlin (PVcomB)**
 - **Knowledge and Technology Transfer – Bridging the gap between fundamental science and industry**
 - **Production Ramp-Up Support** for Industry
 - **Up-Scaling of Results** from Lab Research to 30 x 30 cm² Modules

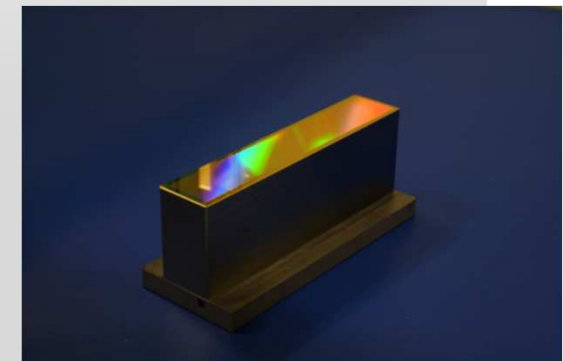




Grating Project



- **Production of High Precision Gratings**
 - Production of Gratings for Synchrotron Applications stopped by German company Carl Zeiss in 2011
 - **HZB takes over Development of High Precision Gratings**
 - **EFRE Project at HZB:**
 - Development of new Ruling machine
 - Development of New Nanotechnology Processes



**Thank you
and
have a successful meeting...**