13th Beam Instrumentation Workshop
BIW08
May 4-8, 2008

DITANET

‹‹ novel **DI**agnostic **T**echniques for future particle **A**ccelerators:
A Marie Curie Initial Training **NET**work ››

Carsten P. Welsch
- On behalf of the DITANET Consortium -

MARIE CURIE ACTIONS

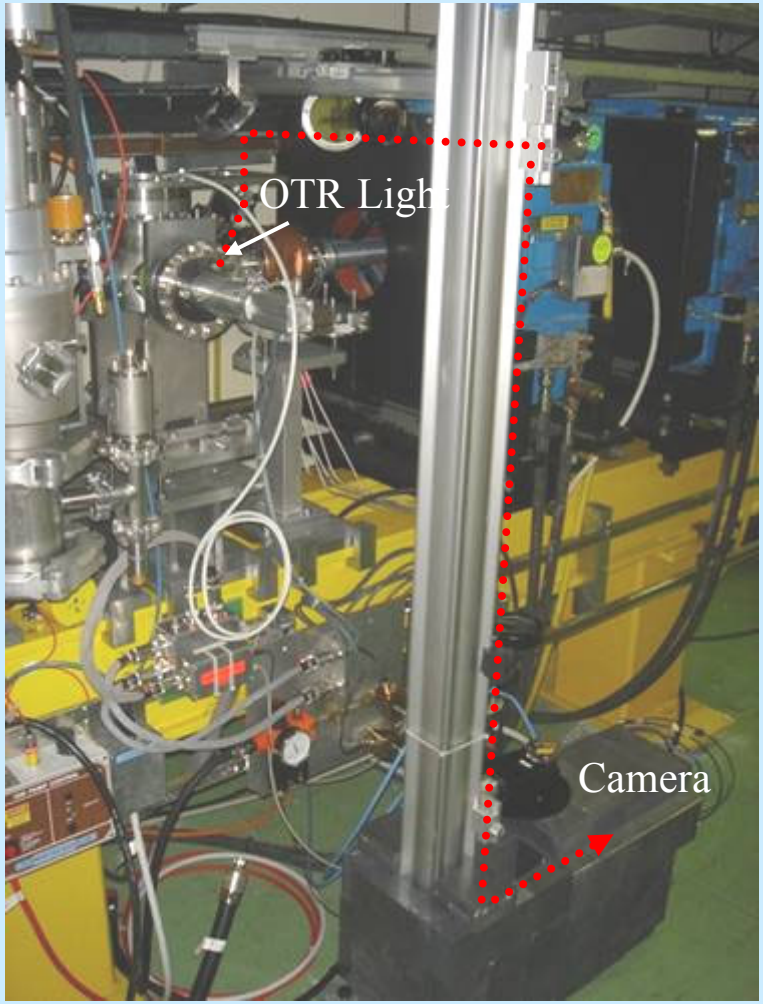
PEOPLE

Outline

- What is DITANET ?
- Involvement of Industry
- Research
- Training
- What does it mean to you ?

c.welsch@gsi.de

A „typical“ Monitor



- Material sciences
- Thermodynamics
- Electro-Magnetism
- Optics
- Mechanics
- Electronics
- Nuclear Physics
- …

⇨ Multi-disciplinary field !

c.welsch@gsi.de

What is DITANET ?

- One of the largest Marie Curie Initial Training Networks ever funded by European Union !
- Funding for 20 fellows (17 ESR and 3 ER)
- Gives industry an important role !
- Allows for inter-sectorial collaboration !
- Recognized importance of beam diagnostics at European level !

(in physics top 12, 2007 – under extreme competition)

c.welsch@gsi.de

The DITANET Consortium

Network Participants

Associated Partners

c.welsch@gsi.de

Including Partners From Industry

Full Network Partner	Offer research training & **Recruit** eligible researchers	Level 1
Associated Partner	Provide research training, **complementary skills courses,** (communication, enterprise cycles, innovation, IPR, …) **secondments**	Level 2
	Member of the **Supervisory Board**: definition of skills requirements for targeted researchers	Level 3

c.welsch@gsi.de

Including Partners From Industry

id Quantique

Instrumentation Technologies

THALES

ThermoFisher SCIENTIFIC

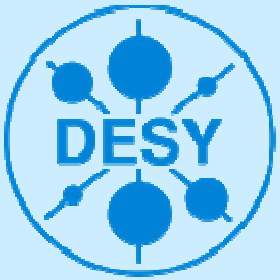
ViALUX

TMD

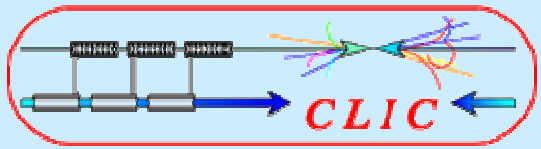
WZWOPTICAG

c.welsch@gsi.de

Examples from the Research Program



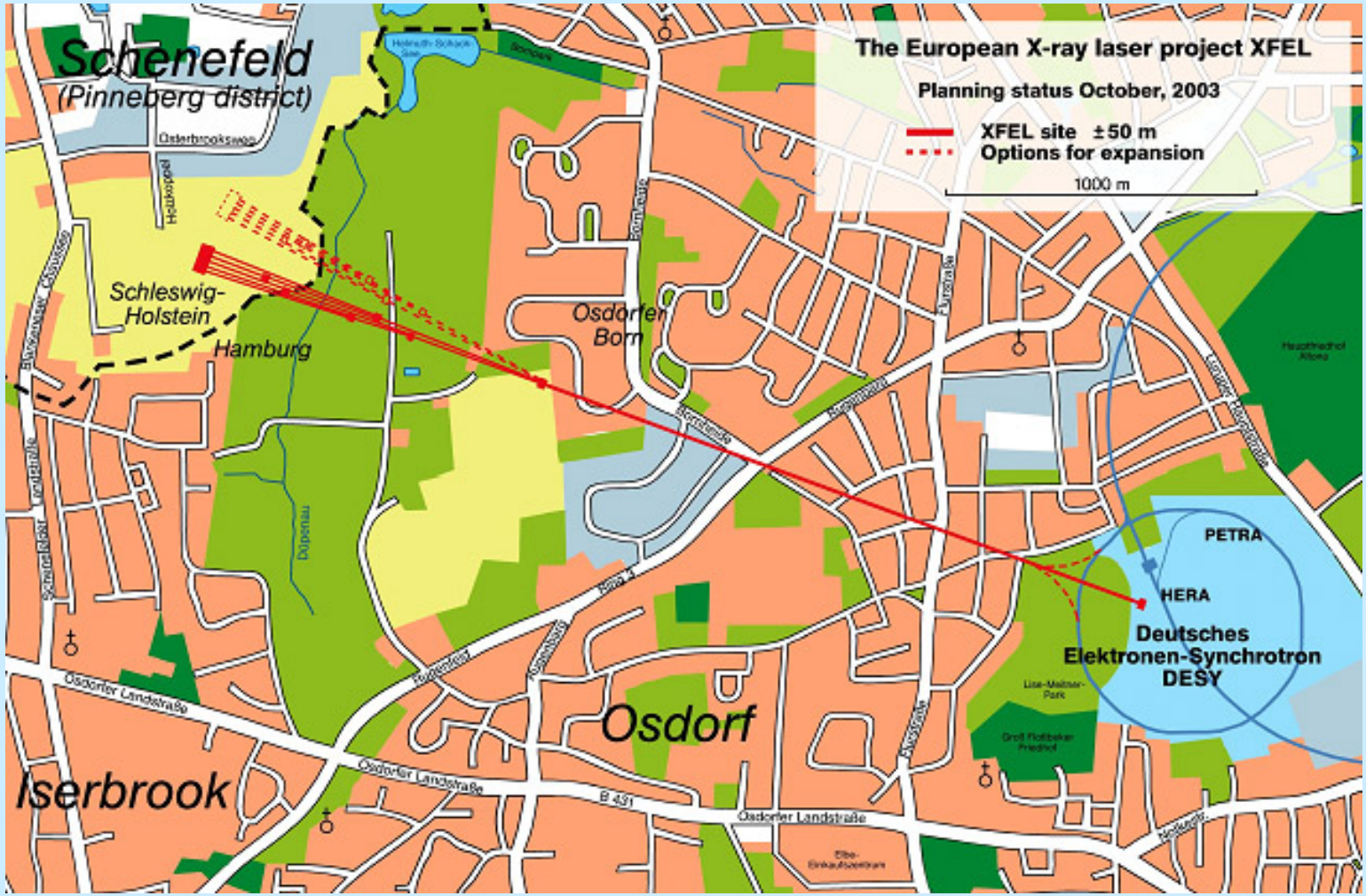
XFEL



CTF3

USR @ F(L)AIR

The XFEL Project



K. Wittenburg

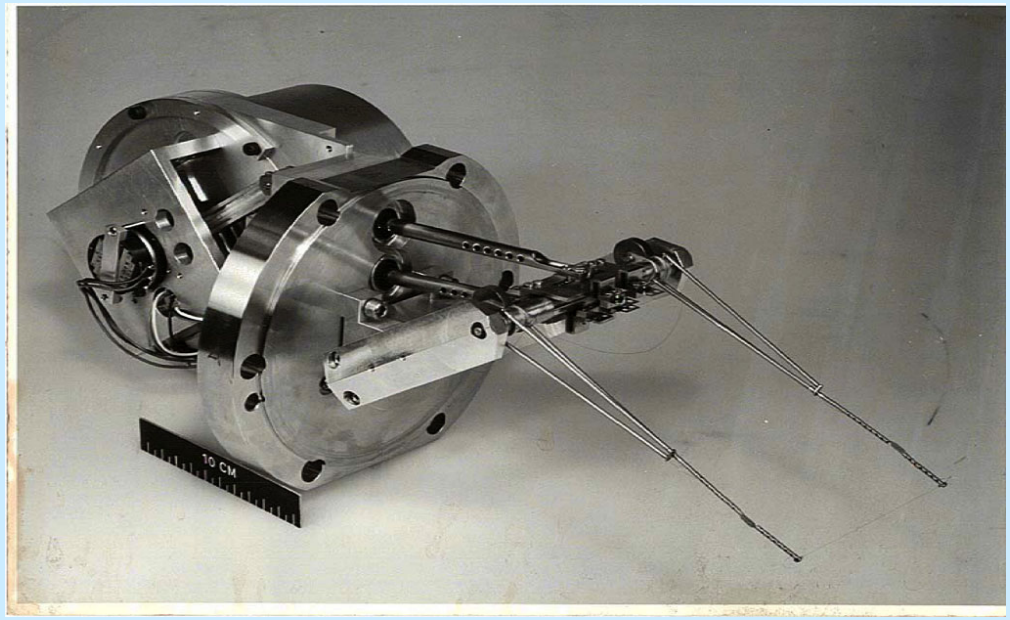
c.welsch@gsi.de

Wire Scanners

..established for measurements in accelerators.

Advantages:

- Resolution: 1 μm
- Reliable
- Direct



K. Wittenburg

c.welsch@gsi.de

Challenge: Heat Load on Wire

$$-\frac{dE}{dx} = \frac{4\pi}{m_e c^2} \cdot \frac{nz^2}{\beta^2} \cdot \left(\frac{e^2}{4\pi\varepsilon_0}\right)^2 \cdot \left[ln\left(\frac{2m_e c^2 \beta^2}{I \cdot \left(1-\beta^2\right)}\right) - \beta^2\right]$$

$$T = C \cdot \frac{dE}{dx} \cdot d' \cdot N \cdot \frac{1}{c_p \cdot G} \left[°C\right]$$

T_{max} ~ 2000°C

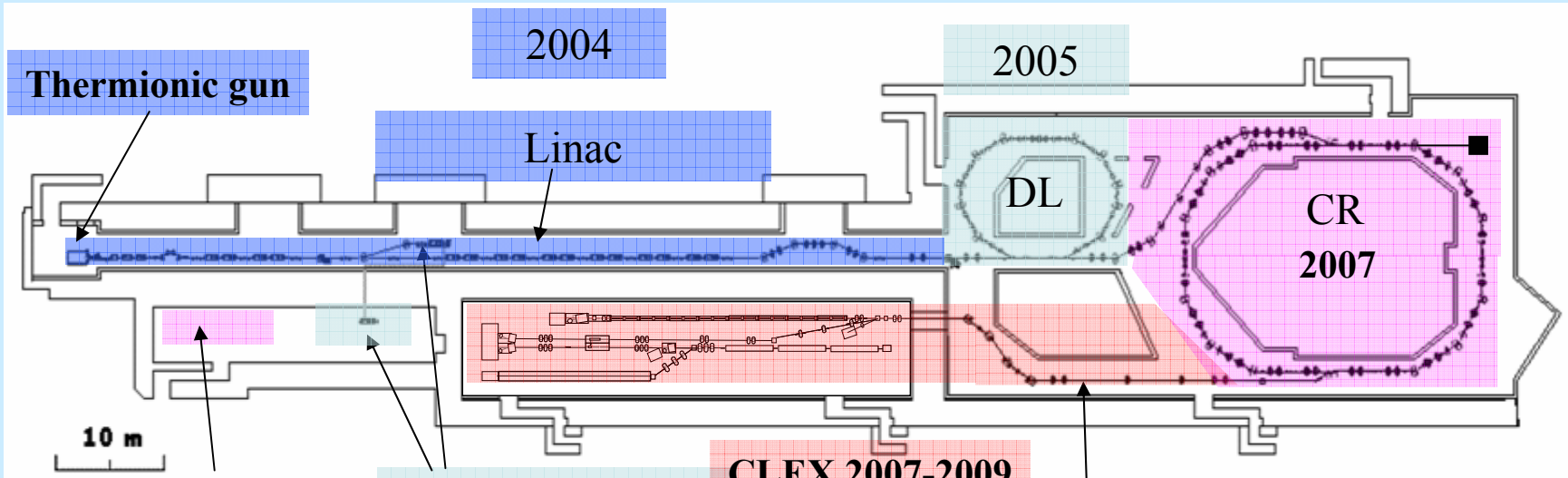
$$N = \frac{d' \cdot f_{rev}}{v} \cdot \left(NB \cdot n_{Bunch}\right)$$

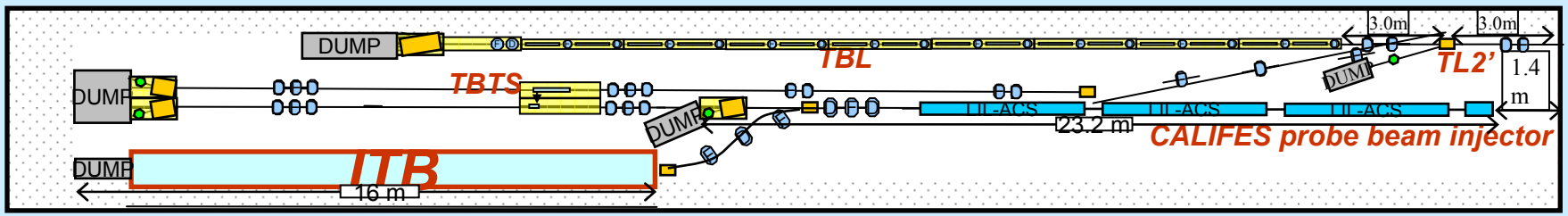
Required: Speed of 10-20 m/s with 1 μm resolution.

K. Wittenburg

c.welsch@gsi.de

CTF3 - Overview





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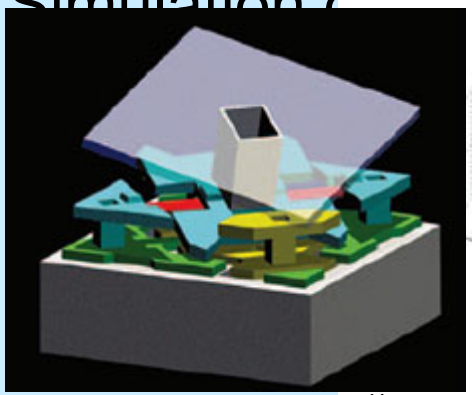
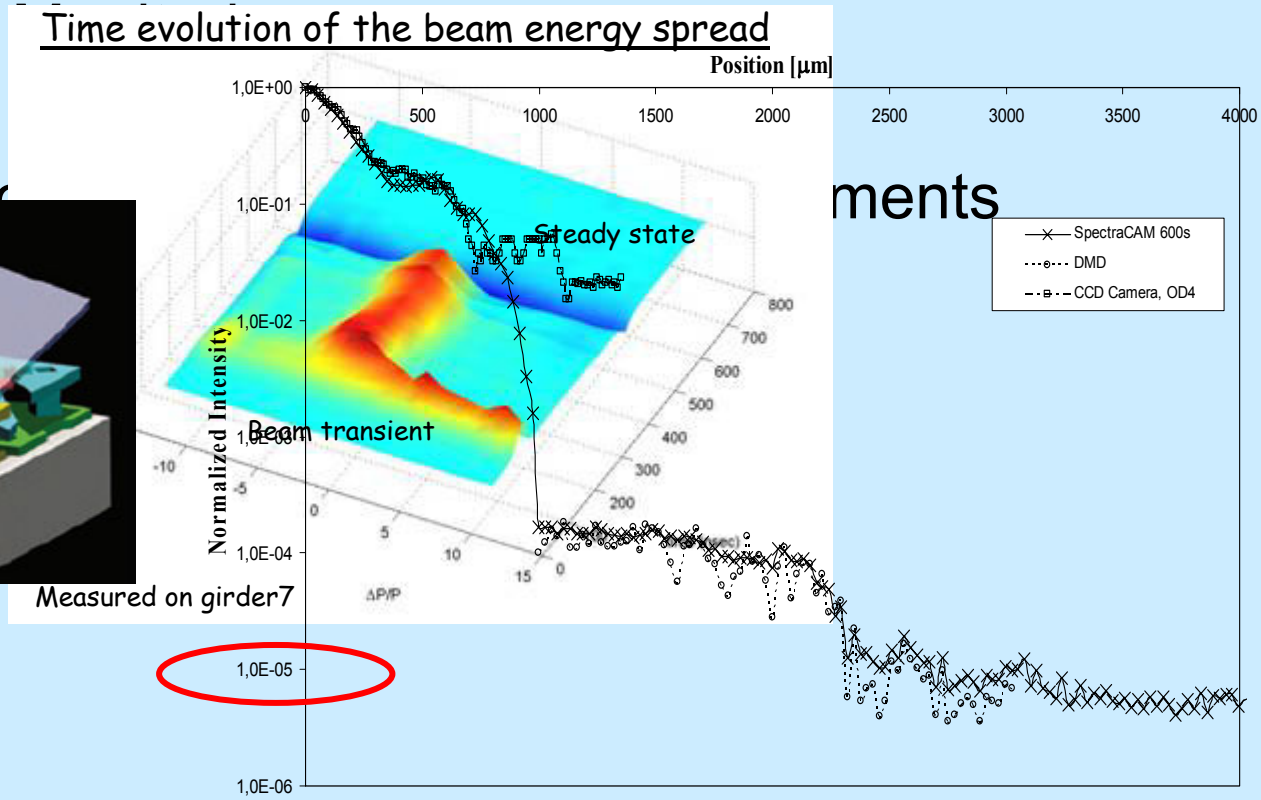
c.welsch@gsi.de

CTF3: An Ideal Testing Platform

- Time-resolved spectroscopy
- Beam Halo
- Simulation
- ments
-
-





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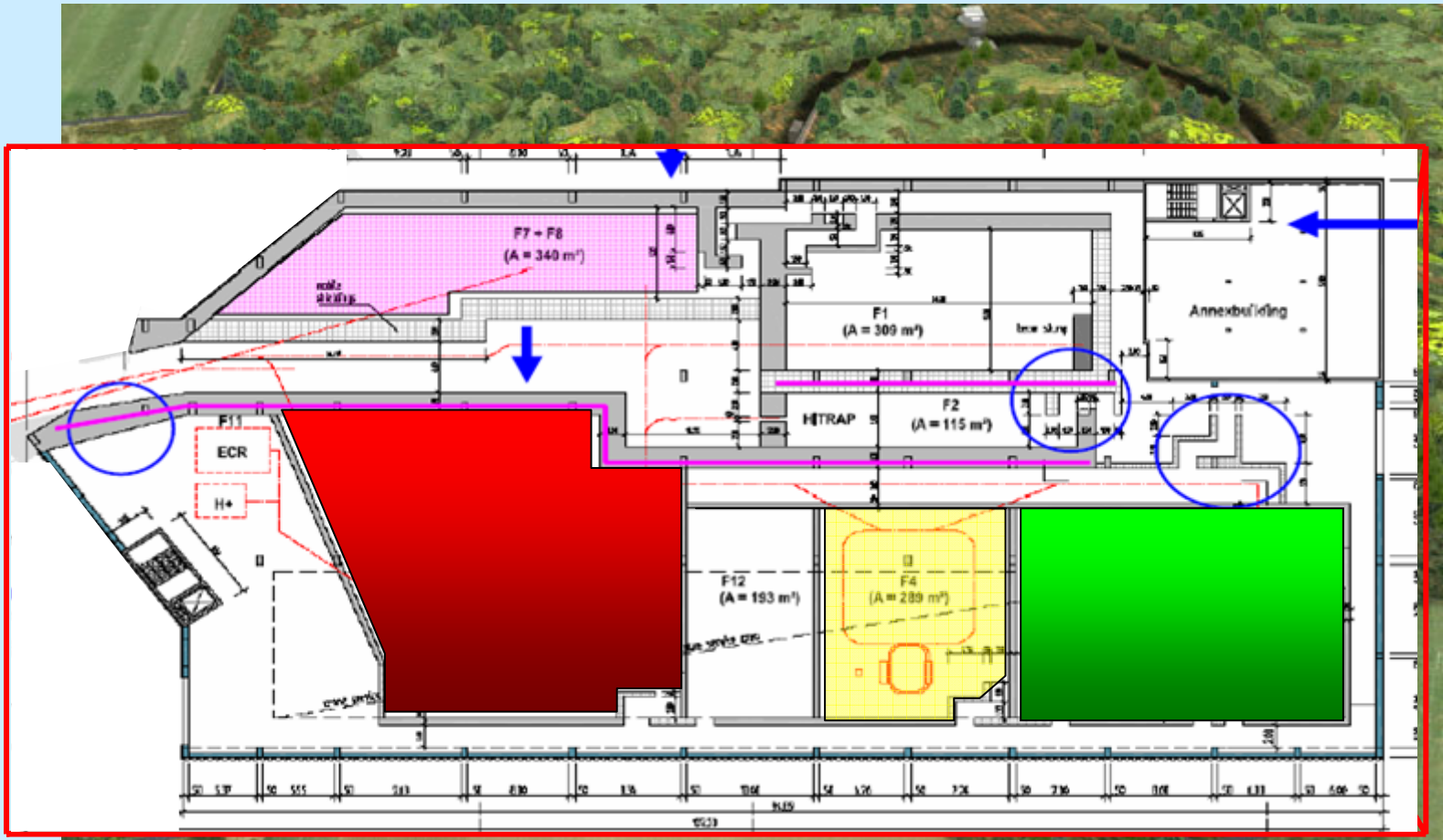
c.welsch@gsi.de

FLAIR @ Facility for Antiproton and Ion Research



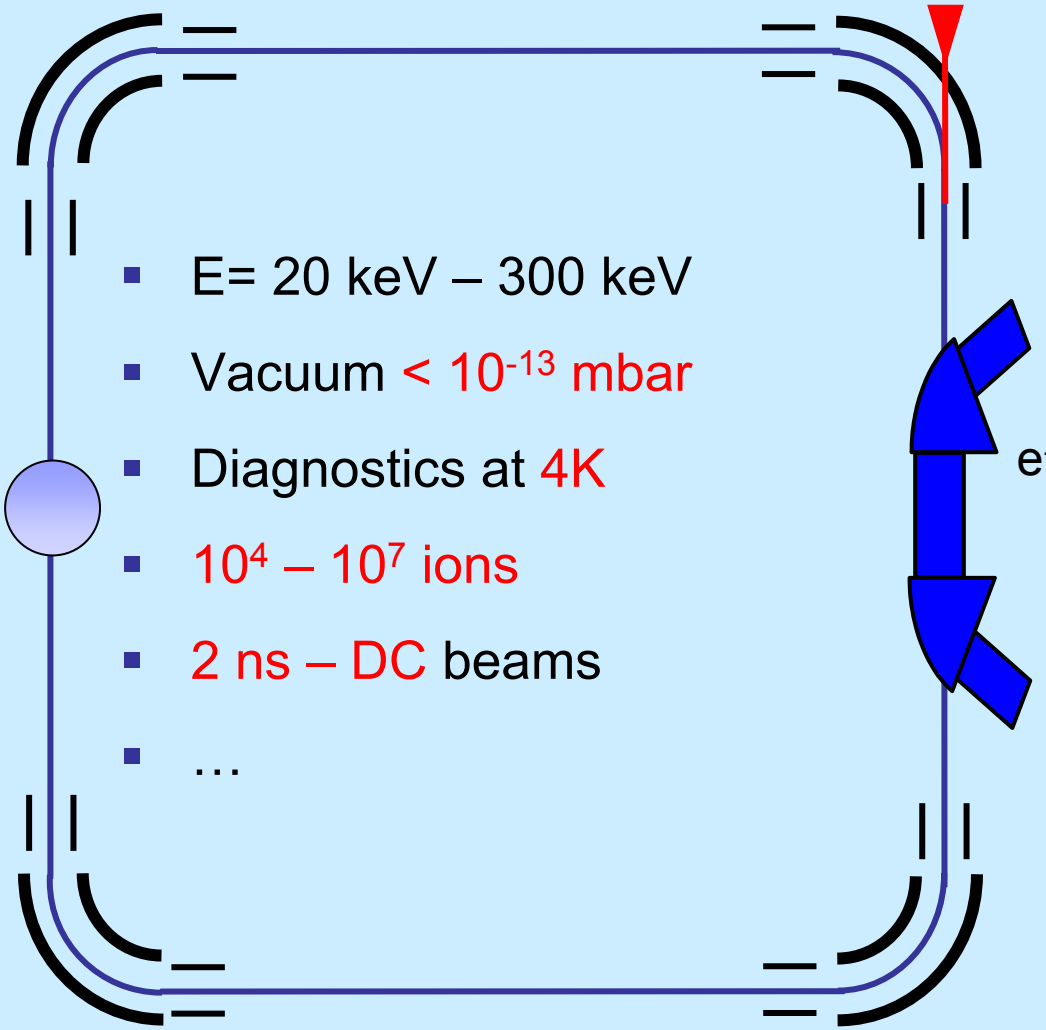
30 MeV - 300 keV

300 keV - 20 keV

keV - ... eV

c.welsch@gsi.de

USR - Challenges



- E= 20 keV – 300 keV
- Vacuum < 10^{-13} mbar
- Diagnostics at 4K
- 10^4 – 10^7 ions
- 2 ns – DC beams
- …

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c.welsch@gsi.de

Training

- Local training by host
- Network-wide schools on diagnostic techniques
- Inter-network exchange of researchers
- Secondments to partners from industry
- Training in complementary skills

⇨ Motivation: *Ideal* Training.

c.welsch@gsi.de

Outreach

- DITANET schools in 03/2009 (London) and 09/2010 (Stockholm)
- DITANET conferences in 2009 and 2011 (DIPAC ?!)
- Mini-Symposia, workshops throughout 4 years

⇨ Open to external participants.

c.welsch@gsi.de

What DITANET means to you

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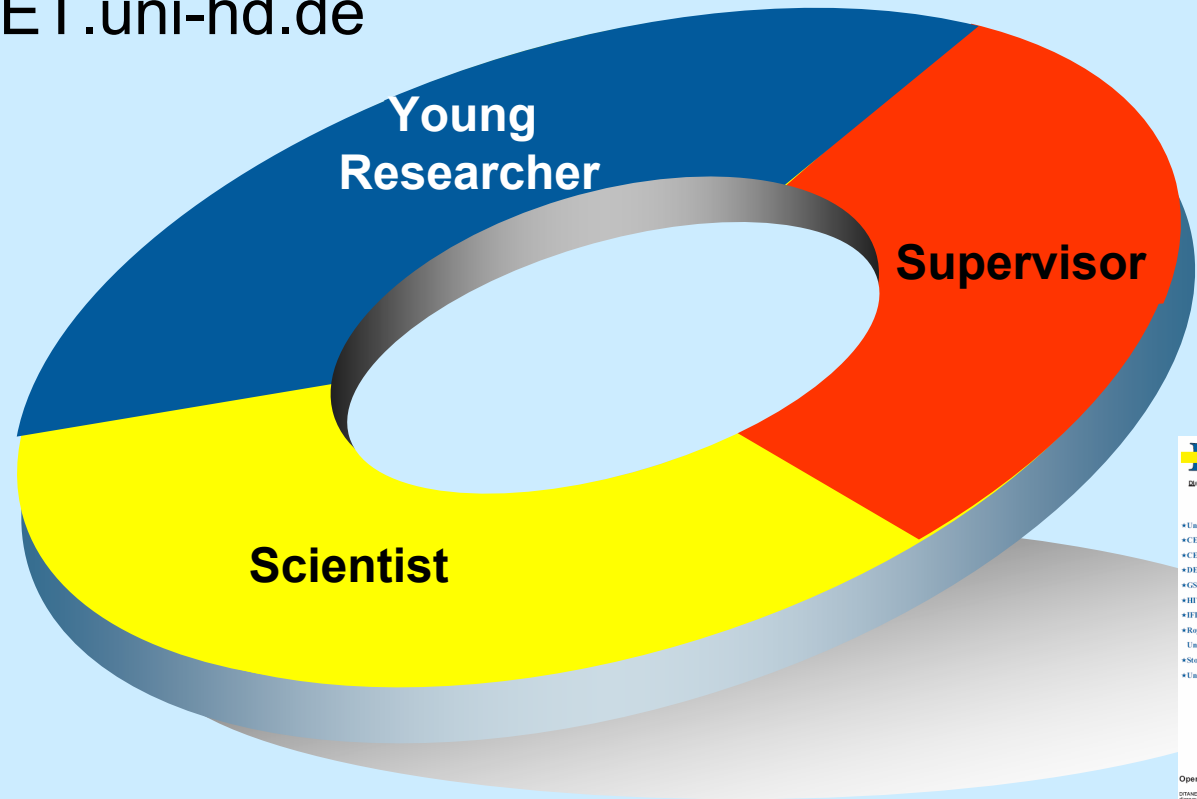
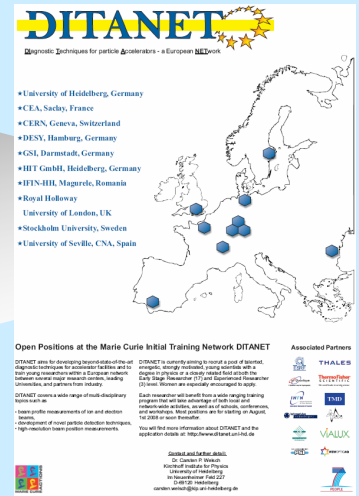




Join in !

c.welsch@gsi.de

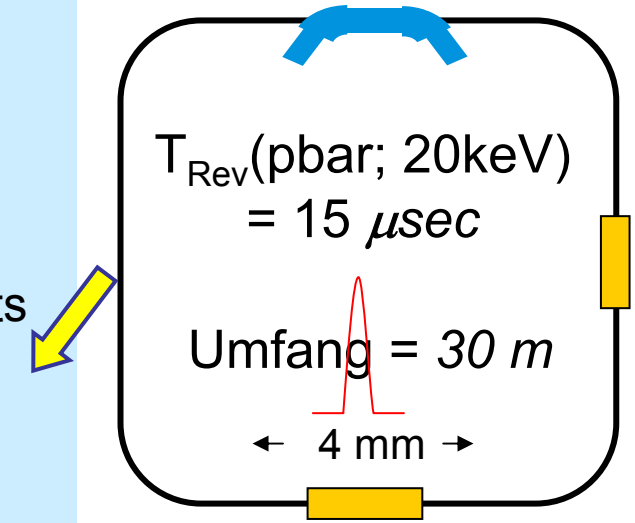
Conclusion

- Unique oppo
- Developmen tween research centers, Univ sector;
- Innovative ap ung researchers;
- Many events mmunity;
- Stimulation o am diagnostics.

c.welsch@gsi.de

USR - Goals

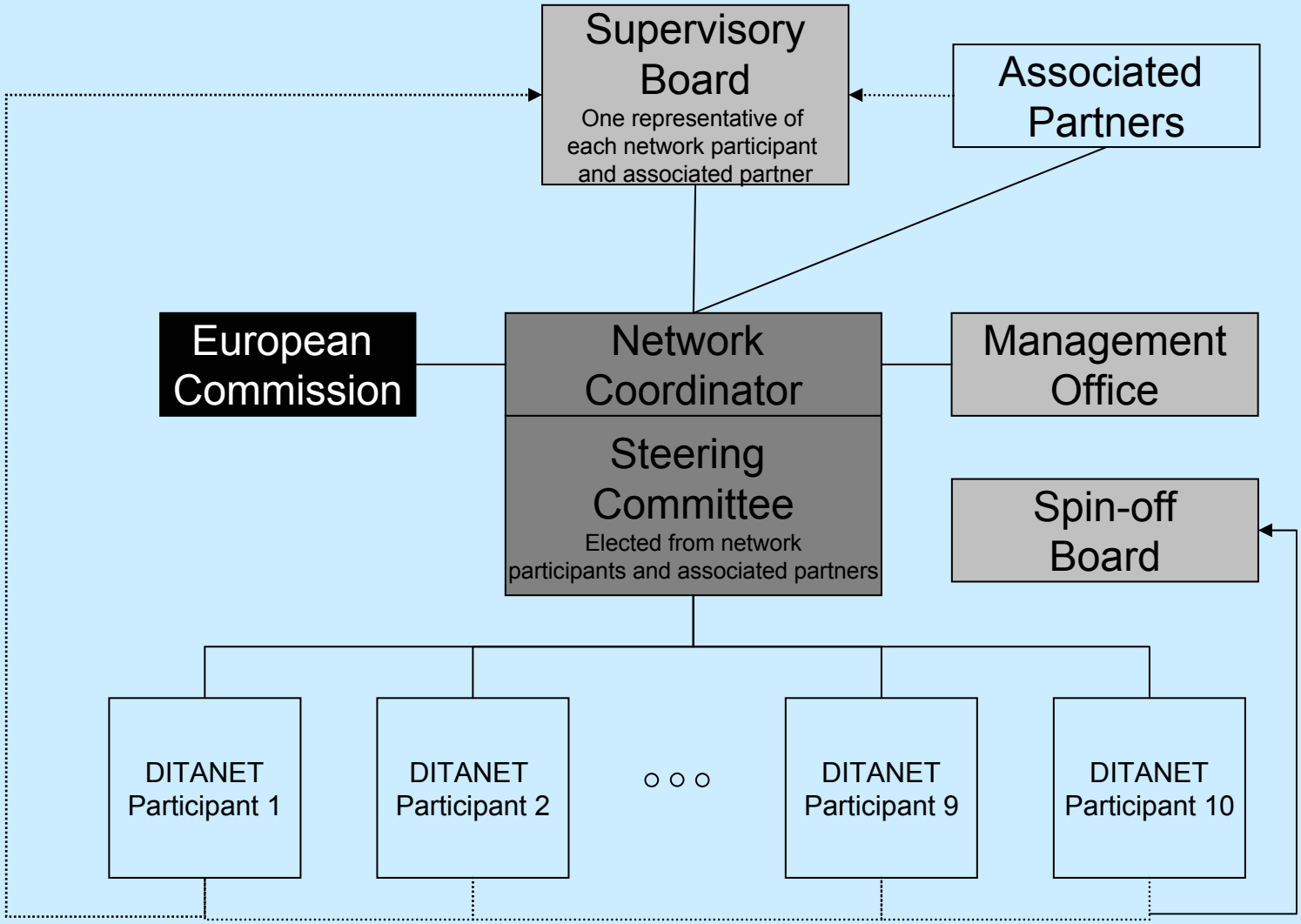
- Variable to lowest energies
  - 300 keV ~ 20 keV
- High luminosity for in-ring experiments
- Well-defined extracted beams:
  - Small emittance
  - Small momentum spread
- Multi-user operation:
  - 2 straight sections for in-ring experiments
  - Slow and fast extraction
  - Additional beam lines possible
- Central requirements
  - Δt ~ 500 nsec for Injection in traps
  - Δt ~ 2 nsec / 10^4 ions for collision studies



QUASAR

c.welsch@gsi.de

Management Structure



c.welsch@gsi.de

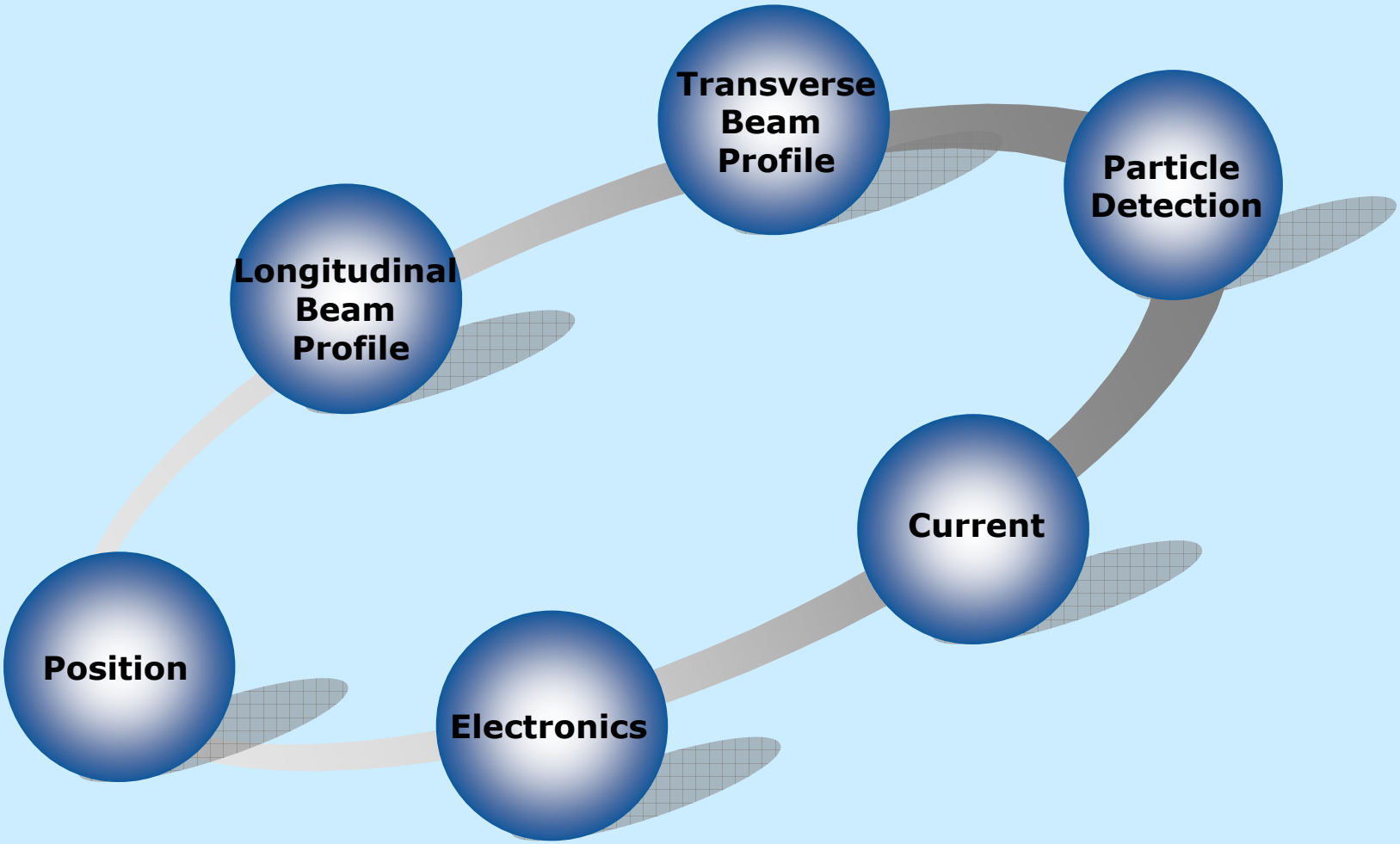
Research

- Development of beam diagnostic techniques for future particle accelerators (LHC, FAIR, XFEL, and small-scale projects)
- Interdisciplinary approach
- Close collaboration with partners from industry

⇨ Aim:XXX

c.welsch@gsi.de

Research: Work Packages



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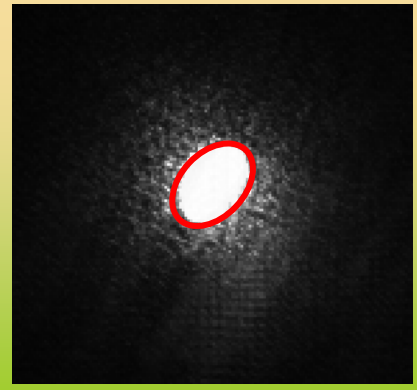
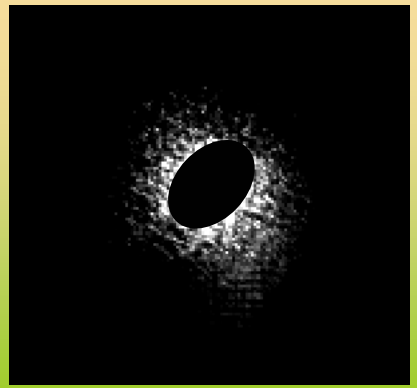
Measurement

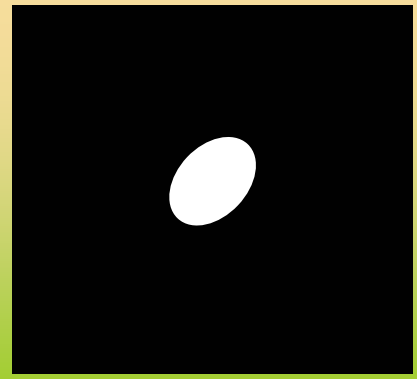
(1) Aquire profile



(2) Define core



(4) Re-Measure



(3) Generate mask

c.welsch@gsi.de

Recruitment Strategy

After acceptance	+ 6 weeks	End June	+ 4 weeks	Soon thereafter
Final Definition of all career development plans. Formalizing secondments and time schedule. *DITANET kick-off meeting*	**Publication of Positions** online and in relevant international journals. Direct contact to prospective candidates.	**Screening of Applications** Criteria: letter of intent, academic records, two letters of recommendation In case several candidates are eligible: Selection board	**Interviews and Selection Board** Criteria: international competition, direct comparison between applicants. Ensure gender balance, equal opportunities to candidates from within/outside network.	**Decision** Based on agreement between host team, thematic partners and coordinator. **Goal** Fill all positions until september 2008.

c.welsch@gsi.de

Auswahl von Kandidaten

		Eligibility Criteria at the time of recruitment	Duration of appointments
INITIAL TRAINING	Early stage researchers *(≥ 80%)*	0 ≤ Research experience ≤ 4 years No PhD	3-36 months
	Experienced researchers	PhD or at least 4 years of research experience & Research experience ≤ **5 years**	3-24 months
Transfer of NEW COMPETENCES	Visiting scientists *(a limited number)*	Experienced researchers (experience >> 4 years) with outstanding stature in international training and collaborative research	≥ 1 month Multiple stays

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