


Netzwerk Teilchenwelt

= Network Particle World

A German Network on Particle Physics education and outreach
funded by the German Federal Ministry of Education and Research
1.1.2010 – 31.1. 2013

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1. Who we are and what we do
 2. Our Activities
 3. Organisational structure
 4. Communication
 5. Network and users' community
 6. Ideas for the future



We are...

... a German Network of

- **scientists**
 - (astro-)particle physics
- **students**
 - aged 15-19
- **teachers/trainers**
 - at schools, school labs, science centres etc.

→ in direkt contact to CERN





We ..

- work with **students AND teachers to bring modern research to the class room**
- offer programs in **particle physics AND astroparticle physics**
- offer young scientists the chances and knowledge to improve **communication skills**





Our Concept

- **4 programm levels**

- **Basic** introduction in particle physics
- **Qualification** participants organize own projects
- **Deepening the experience** - workshops at CERN
- **Research projects** at research institutes

students AND teachers

- **4 central elements**

- **local projects** all over Germany
- **workshops at CERN**
- design of **context materials**
- scientific **evaluation**

particle physics- and cosmic-projects about the year

Activities 2010 / 2011 / 2012

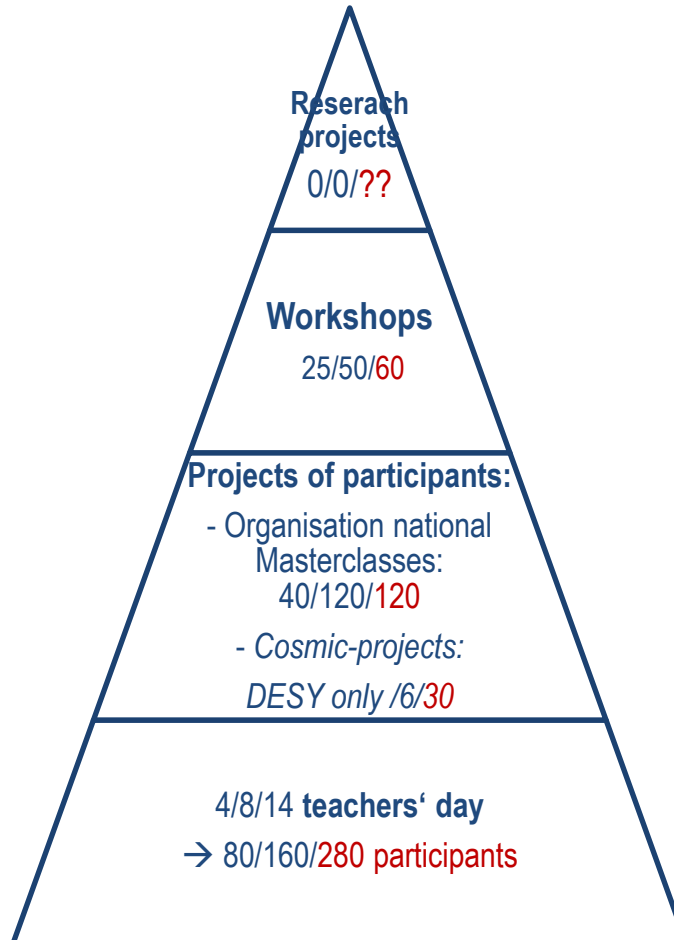
Research projects

CERN

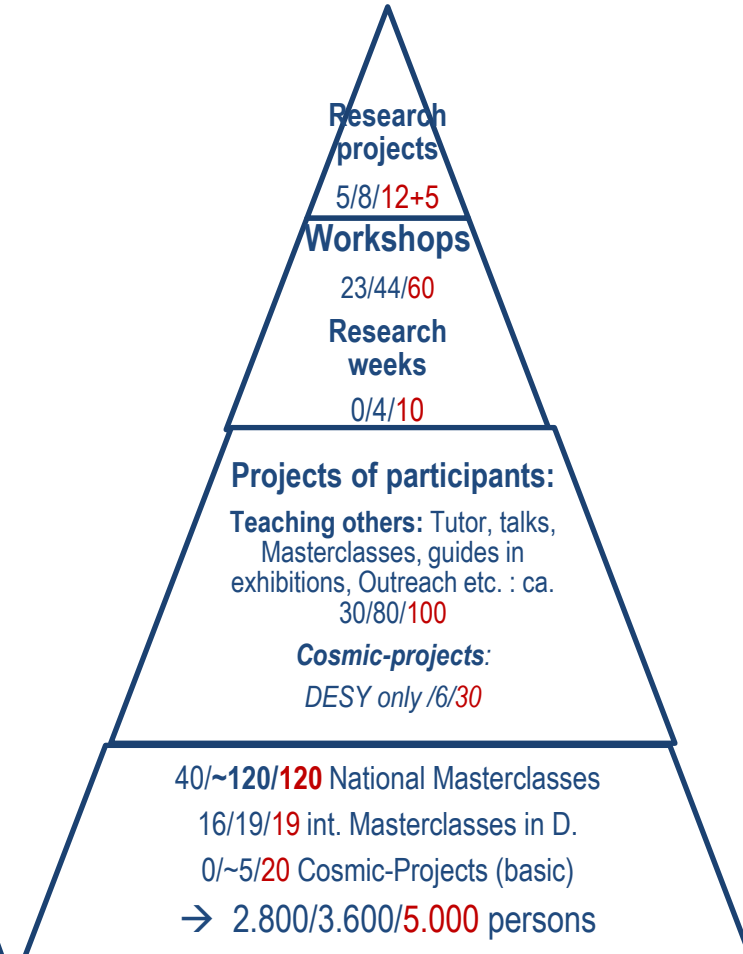
Qualification

Basic Programm

teachers/trainers



students



activities: National Masterclasses

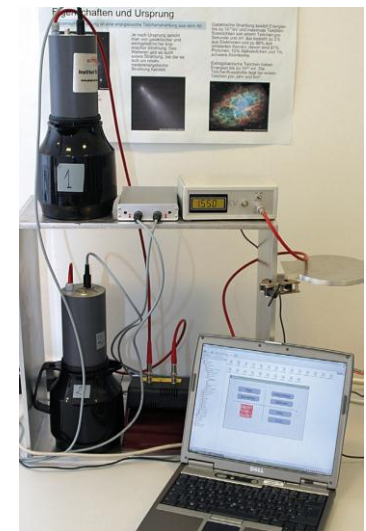
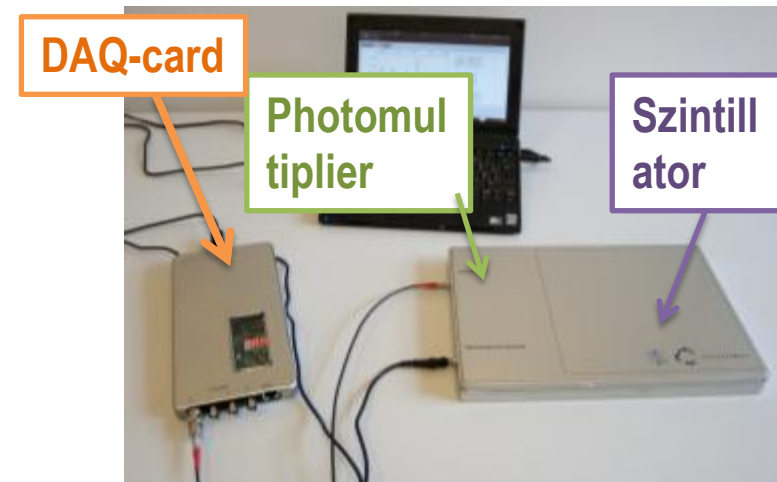
- **what:** about 120 „national masterclasses“ a year
- **where:** mostly in schools, also school labs, fairs, exhibitions
- **how :** 4-5 hrs, one talk, measurements, quiz, no videoconf
- **supervision:** mostly PHD-students, assisted by students (school) and teachers (materials in design and development)
- **group:** about 20 students
- **data:** LHC/LEP-measurements



National Masterclass in Lenggries (MPI München)

activities: cosmic-project* (DESY Zeuthen)

- **what:**
20 „basic introductory days“,
30 „project weeks“,
~5 research projects a year
- **how:**
„Scintillatorexperiment“, using Quarknet DAQ card
„Kamiokanne“
Web-experiments (Trigger Hodoskop, polar ship)
mainly activities in „qualification“ and „research“
stage
- **Students:** project week (1-2weeks)
- **Teachers:** teachers days
- **supervision:** mostly PHD-students and teachers



*since Dez. 2010



activities: „qualification“ stage

Students: „spreading their knowledge to others“

- tutor in masterclasses, cosmic-experiments
- talks about particle physics at school
- guides in exhibitions; help with outreach-activities
- ... even holding a masterclass themselves

Teachers: „organizing particle physics projects“

- organising masterclasses, cosmic-projects
- preparation of masterclasses
- ...

activities: CERN-workshops and project weeks (CERN, partially with German Teachers Program)

- **students:**

- 60 participants in two workshops a year (3 days)
- 10 participants in project weeks
(own research projects)

- **teachers:**

- 60 participants in two workshops (5 days)
- **CERN-Workshops are a big motivation for activities in the „qualification stage“ and very effective training for teachers in modern physics**





activities: research projects

Students:

- research projects for 3-10 months
(particle physics/astroparticle physics)
- often part of final school examinations
- work on own measurements
- Tutors: PHD-students and senior physicists
at universities and teachers

teachers:

- planning: research projects in
(astro-)particle physics and didactics
- current problem: lack of physics teachers in German schools
(no chance for sabbatical)



Impressions

Excited participants at the 1st students' CERN-Workshop in November 2010

Testing the new LHC-ATLAS-W-Data at the same workshop

Teachers with cosmic experiments at the 1st CERN-Workshop für teachers (with German Teachers Programme)

Participants at the finals of the German Competition „Jugend Forscht“ (astroparticle physics project)

backbone organisation / structure

- **Coordination:** Institute for nuclear and particle physics, TU Dresden
- **Workshops:** CERN, German Teachers Programme
- **Context material:** physics didactics, Uni Würzburg
- **Scientific Evaluation:** physics didactics TU Dresden
- since 2011: **Astroparticle project:** DESY in Zeuthen
- **Funding:** BMBF (1/2010-1/20123)
- **patronage:** the German Physical Society
- **Partner:** www.weltderphysik.de



GEFÖRDERT VOM



Bundesministerium
für Bildung
und Forschung

Local Organisation

- 22 institutes in „Netzwerk Teilchenwelt
 - 19 Institutes International Masterclasses
 - 8 Institutes teachers day
 - 15 Institutes astroparticle physics
- = almost all particle physics institutes in Germany

➤ around 140 scientists involved !

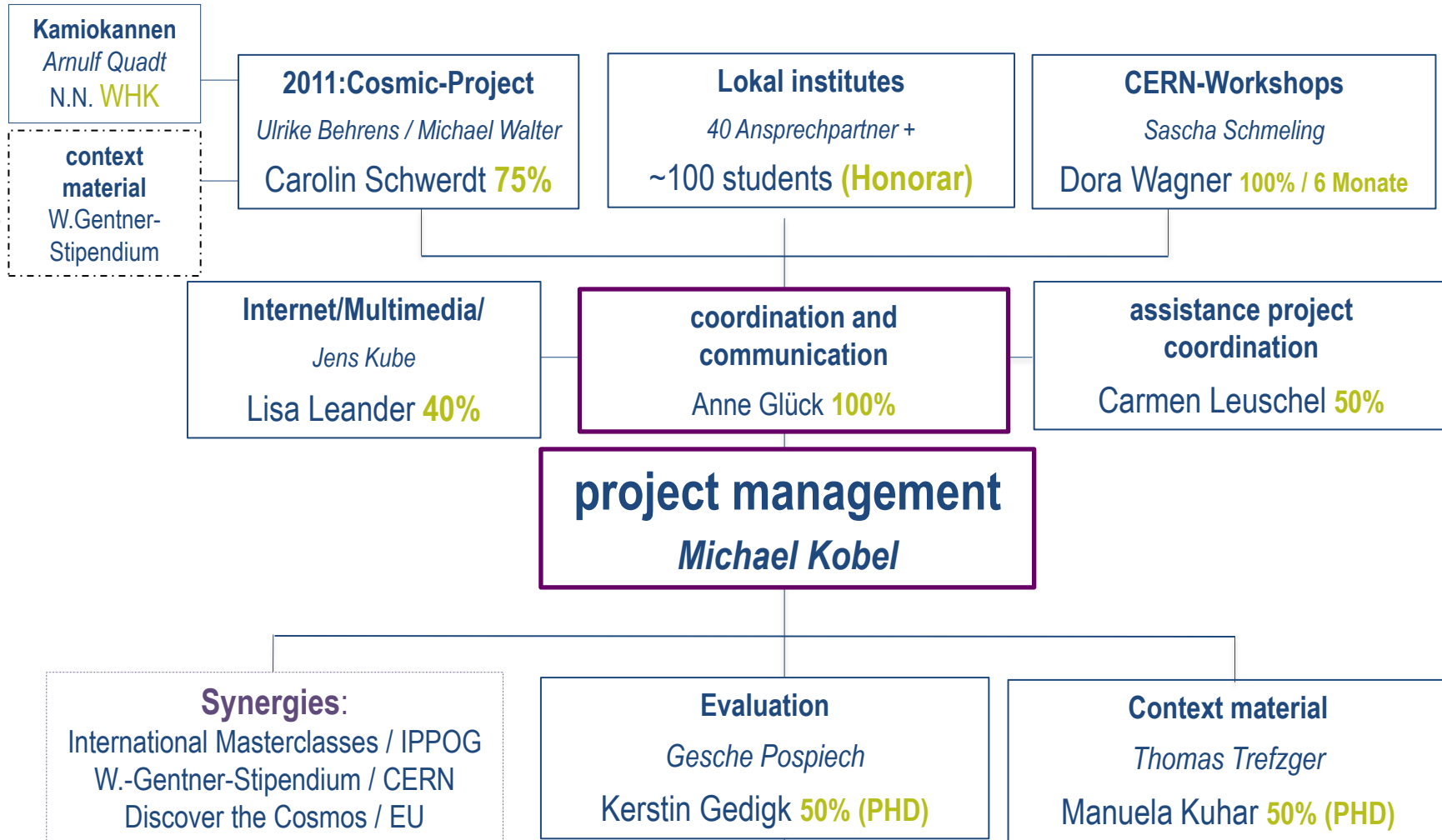




Lots of people behind the scenes in the organisation team...

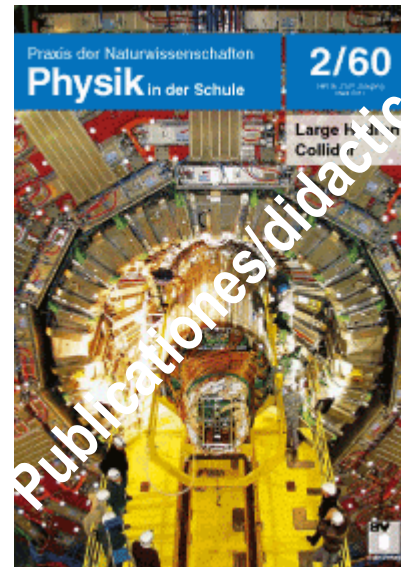
... e.g. at a workshop to discuss the context materials at DESY in Zeuthen

3. Manpower Netzwerk Teilchenwelt*



*green= funded by NTW

4. No network without: communication



5. Network and users' community

Status Community Netzwerk Teilchenwelt

scientists and staff Netzwerk Teilchenwelt:

~ 100 scientists, 6 staff (+ 10)

- activities
- experiments
- experimentators
- communication
- Ideas/leading
- scientists' perspective

teachers:
~ 120-280 involved
in activities
?? –teaching locally
with input from
CERN-workshops

students:
Mostly recipients
~100 Activities local
level
short-time involvement

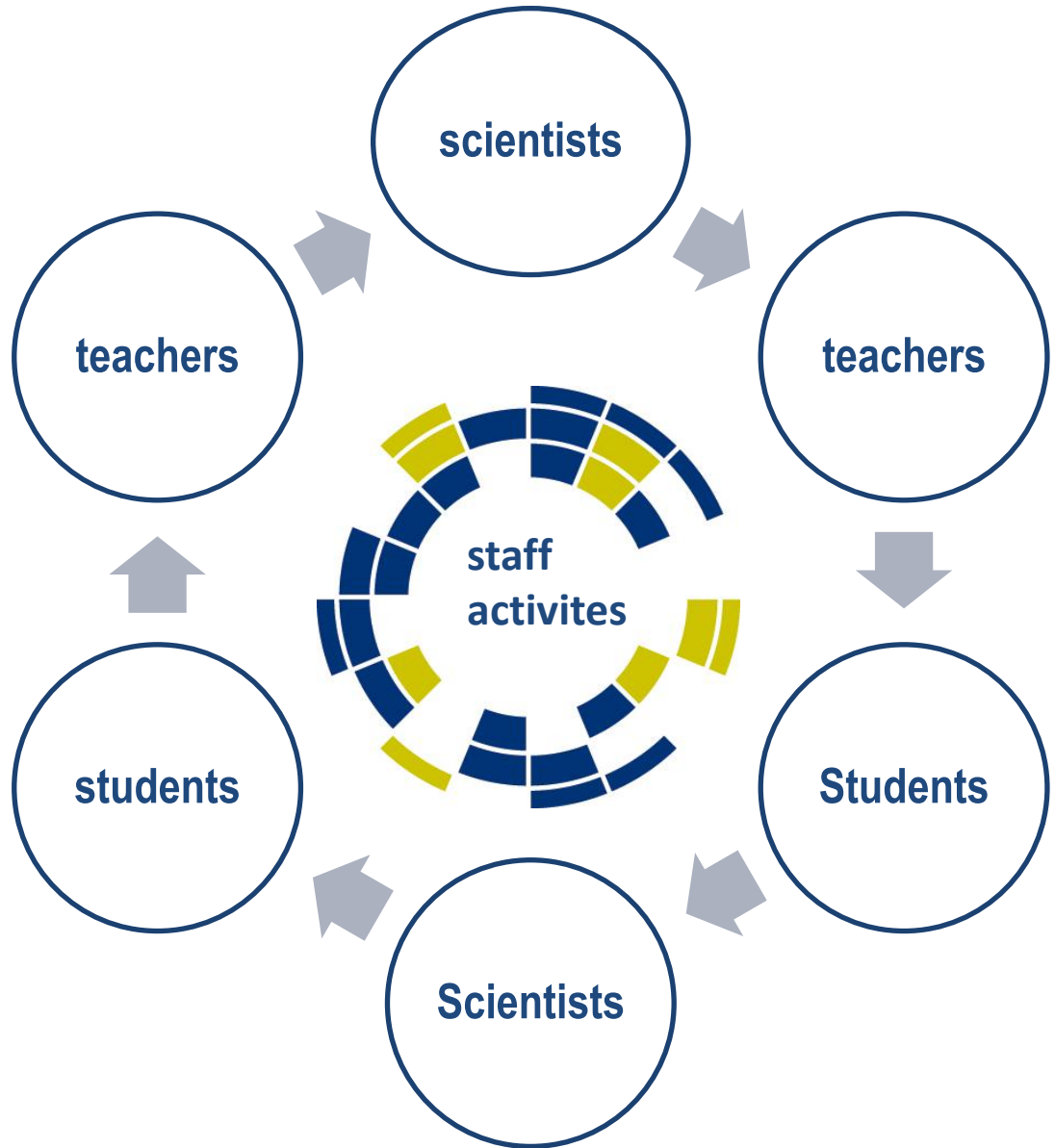
...rather top - down organisation

5. Network and users' community

Utopia:

For a longer lasting competence in modern science teaching

- Benefiting from each others' perspective
 - sharing knowledge and needs
- more interaction between the different groups
 - developing experiments together
- Developing teaching material together
 - moderation by the staff



For long term effects you need the teachers...



5. Network and users' community

Status: Teachers

- **NTW: Teachers' training in (astro)particle physics:**
 - teachers' days
 - CERN-Workshops
- **Local teachers' involvement in the network**
 - organizing events at their own schools
 - Partially: disposing students for events
- **National teachers' involvement**
 - social media interaction: Forum, Facebook
 - **But:** mostly recipients of communication activities



5. Network and users' community

Ideas and visions: Teachers

Sharing the knowledge:

- using the teachers' ideas and potential to improve context materials and events
- long-term involvement of teachers in science (sabbaticals?) → „refreshing“ the scientific experience
- Using teachers as multipliers for curricular development etc.



5. Network and users' community

Ideas and visions: Teachers

Challenges:

- lots of changes in current school system in Germany
- workload of engaged teachers
- sabbaticals: Lack of physics teachers in Germany
- Universities: Lack of capacities and interest at for local organisation
- lack of staff to coordinate activities nation wide
- Scientific involvement of teachers??



6. Ideas for the future

New idea: teachers' network

- Improving particle physics activities for school: Long-term-involvement of teachers in the top stage of the network (workshops, conferences, communication platform, shared knowledge)
- Science projects for interested teachers
- nation wide workshops with teachers at the top stage of the network
- To say „thank you“: „modern science“-certificate for schools with engaged teachers

→ **Aim:** „win-win“ situation for students, teachers and universities

→ We are curious about your experience and want to learn from Quarknet

We're curious about the
U.S. experience!

More information:
www.teilchenwelt.de

ORIGINALSCHAUPLATZ



PARTNER



SCHIRMHERRSCHAFT



PROJEKTLEITUNG



GEFÖRDERT VOM

