

# The Analysis Centre

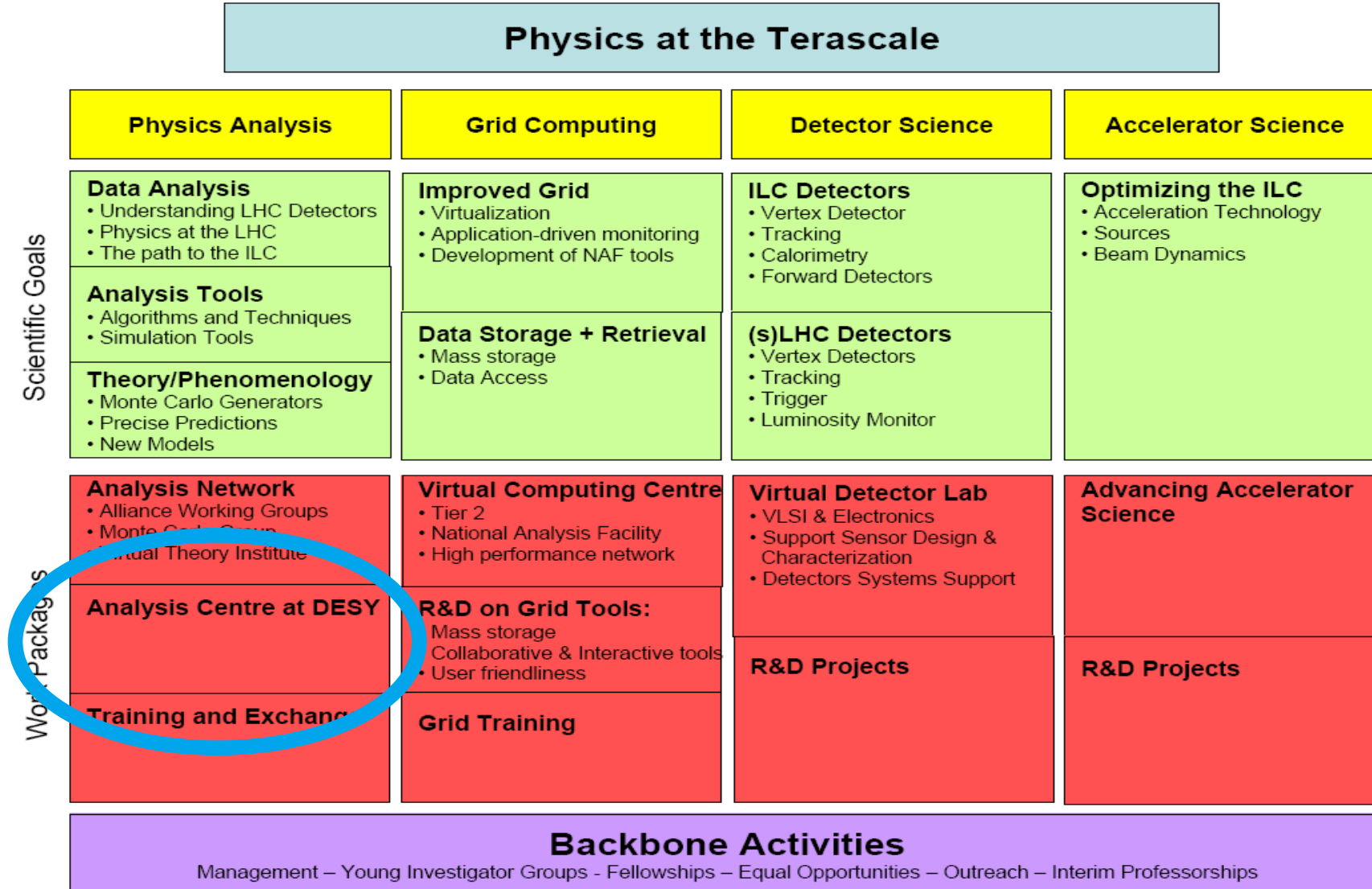
In the Helmholtz Alliance “Physics at the Terascale”

Thomas Schoerner-Sadenius

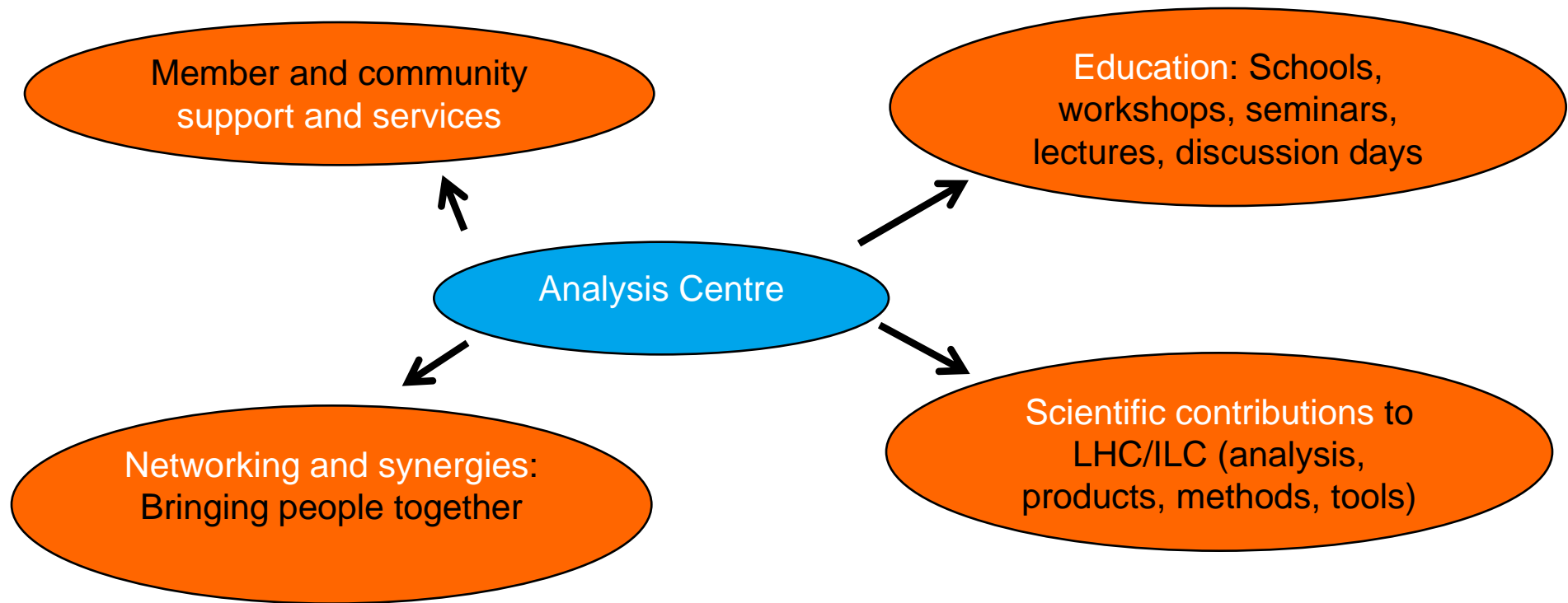
PoF Evaluation Meeting

DESY, 26 February 2009

# THE ALLIANCE “PHYSICS AT THE TERASCALE”



# THE ANALYSIS CENTRE



## Vision:

- > THE place for analysis-related issues in Germany!
- > THE place for coming together, discussing, working!
- > THE place for tools development (algorithms, methods, software, ...)!>
- > Central DESY activity, parallel to other groups (ATLAS, CMS, ...).

# ANALYSIS CENTRE: WORKING GROUPS

- Three working groups focusing on issues of general relevance, building on DESY experience.

## MC Generators:

- Theorists and Experimentalists working on all MC aspects.
- Programme: Systematic tuning of generators, parton shower, UE/MPI.
- Many individual + group projects (“Pheno days”).
- Two DESY positions for group support.

## PDFs:

- General PDF support
- Development of open-source PDF ftools.
- Beginning of intensive collaboration theory - H1/ ZEUS.
- Theory of hard processes at LHC.
- Involvement in many contexts (PDF4LHC).

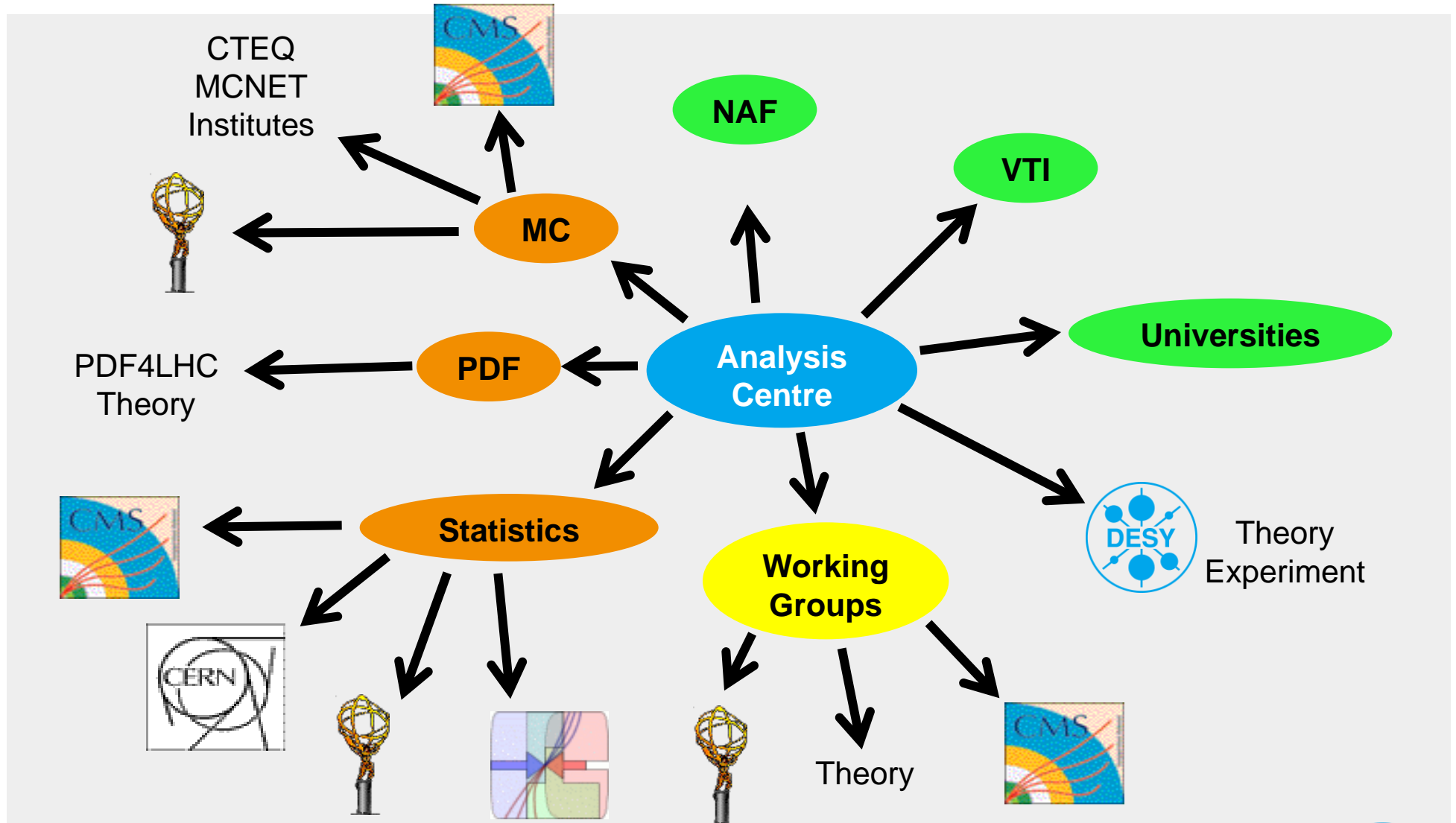
## Statistics Tools:

- Development, implementation and support of statistics projects.
- Contacts to CERN / statistics committees.
- Open DESY position being filled.
- Statistics service for all analysers.

- Regular meetings, introductory schools, numerous ideas and projects.
- Groups growing, attracting more non-DESY people → core of centre.
- Strong participation of DESY staff essential!



# ANALYSIS CENTRE: WELL CONNECTED



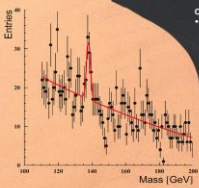
- Organisation of schools and workshops seen as central task of the Analysis Centre.
- Successful start, many projects around:

**School on Statistics Tools**

**PHYSICS AT THE TERASCALE**  
Strategic Helmholtz Alliance

29 September – 2 October 2008  
DESY, Hamburg Site

Learn about statistical methods needed for the analysis of the LHC data. This workshop consists of plenary lectures, special highlight talks and practical work on example problems in smaller groups.



**Covered Topics:**

- Optimal signal/background separation, multivariate techniques
- Searching for signals, discoveries, limits
- Advanced likelihood fit techniques
- Special practical problems, e.g. data corrections (unfolding), systematic errors

**Invited Lecturers:**  
Volker Blobel  
Glen Cowan  
Luc Demortier  
Markus Schumacher  
Helge Voss  
Rainer Wanke

Organising Committee: D. Bortone, M. Grimm, C. Kleinwort, B. Schmitt  
Registration deadline: 19 September 2008. Please register via the school webpage.  
<http://www.terascale.de/stat2008>

**School on Parton Distribution Functions**

**PHYSICS AT THE TERASCALE**  
Strategic Helmholtz Alliance

12-14 November 2008,  
DESY, Zeuthen

The PDF school covers hard scattering reactions at colliders, both from the theoretical and the experimental side. Emphasis is put on the current information on parton distributions (PDFs) and their impact on predictions and measurement of cross sections at the terascale. The lectures are targeted at PhD students and young post-docs.

**Speakers:**

- Sergey Alekhin (HEP Protvino)
- Johannes Blumlein (DESY)
- Alexandre Glazov (DESY)
- Joey Huston (Michigan State Univ.)
- Sven-Olaf Moch (DESY)
- Pavel Nadolsky (Michigan State Univ.)
- Eram Rizvi (Queen Mary, U. London)
- James Stirling (Cambridge Univ.)
- Andreas Vogt (Liverpool Univ.)
- Markus Wobisch (Louisiana Tech.)

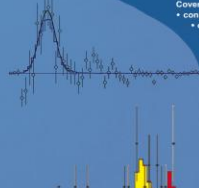
The school fee of Euro 25 has to be paid cash at the registration desk during the school.  
Registration deadline: 10 October 2008. Please register via the school webpage.  
Organising Committee: J. Blumlein, A. Glazov, S.-O. Moch  
<http://www.terascale.de/pdf2008>

**School on Fitting and Related Topics**

**PHYSICS AT THE TERASCALE**  
Helmholtz Alliance

30 March – 2 April 2009  
DESY, Hamburg Site

Determining parameters from fits to data will be a crucial task in analyses of the upcoming LHC data. This school aims at providing education on this topic from a basic to the more advanced level.



**Covered Topics:**

- constant, straight line, parabola & others fits
- clever choices of parameters
- normal equations
- parameter errors and correlations
- fit quality and outlier rejections
- non-linear fits: signal peak(s) on background
- Poisson vs Gaussian statistics
- binned vs unbinned fits
- constraint fits
- (special) software tools
- nice physics examples

Organising Committee: O. Behnke (DESY), F. Ellinghaus (Mainz), M. Goebel (DESY), C. Henkel (Duisburg), C. Kleinwort (DESY), R. Kreuzinger (Duisburg), B. Liu (Hamburg), B. Mala (Hamburg), L. Radvanyi (DESY), C. Schmitt (Duisburg), A. Schumacher (DESY), S. Schmitt (DESY), Y. Schmitt-Sadenius (DESY), G. Siegel (Karlsruhe), G. Teyssie (Karlsruhe)  
Registration deadline: 16 March 2009. Please register via the school webpage.  
<http://www.terascale.de/fitting2009>

**Monte Carlo School**

**PHYSICS AT THE TERASCALE**  
Helmholtz Alliance

20-24 April 2009,  
DESY Hamburg

The school covers Monte Carlo techniques and automated calculation of matrix elements. The focus of the school is on Monte Carlo event generators for simulation of processes beyond the standard model. The simulation of QCD and electroweak "background" will also be covered. In practical exercises, BSM signal processes as well as standard model background will be simulated and analyzed.

**Topics:**

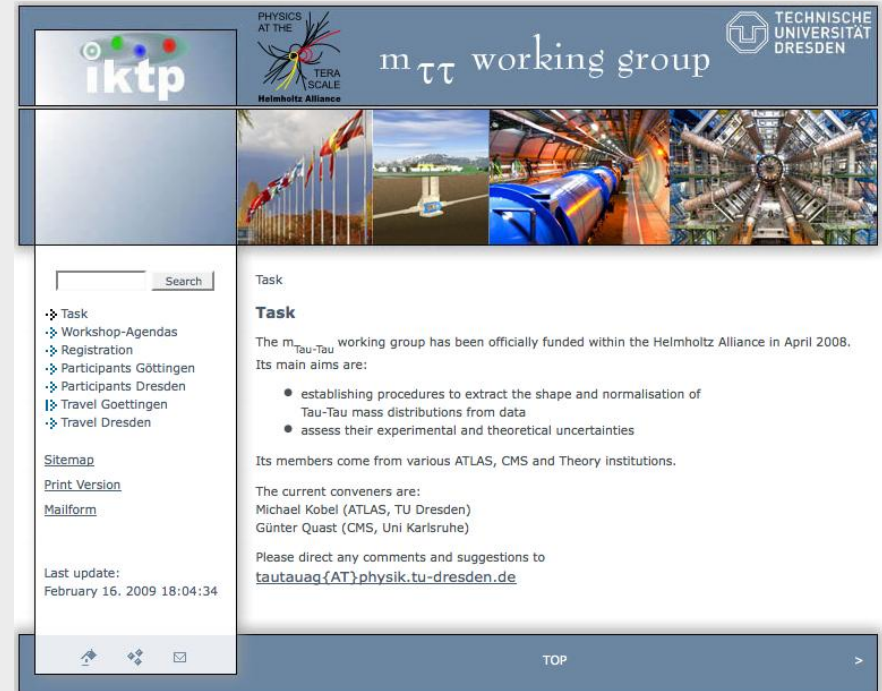
- Monte Carlo techniques and standard physics (5 classes)
- Automated matrix element calculations (7h. Oth.)
- Monte Carlo event generators (Hervé (U. Richardson), PYTHIA (M. Corbelli), Shairua (B. Schumacher), MadEvent (F. Fabbri), Whizard (M. Kilius), Holo-Phiggs (R. Bruck), SHERPA (T. Bärnreuther)
- Exercises

Registration deadline: 31.03.2009  
Please register via the school webpage.  
Organising Committee: W. Eisele, S. Gieseke, M. Grimm, H. Jülich, J. Kitz, W. Kohn, B. Lohmeyer, R. Maier, Z. Nagy, Th. Schumacher  
<http://www.terascale.de/mcs2009>

- Design of programme in close collaboration with universities.
- Soon: MC School, Fitting School, Detector Understanding with First Data, Scientific Computing, ...
- Experience: Schools and workshop fill a real gap; many (and many happy) participants!

# ANALYSIS WORKING GROUPS

- > Concept: Focus on questions which can profit from cross-experiment efforts.
- > Examples: Mtautau, jet veto in VBF, Higgs + heavy flavours, BSM parameters at LHC, ...
- > Some more ideas around.
- > New: “Knowledge Data Base”
  - Who is doing what where?
  - Starting point for newcomers;
  - seed for new working groups?
- > Activities are starting – we have to feel our way.  
Close cooperation with experiment-specific activities important.





# ANALYSIS CENTRE: FURTHER ACTIVITIES

## “Discussion / Pheno Weeks”

- Bringing together few experts for few days of intense discussion and work.
- Very good and productive experience.
- Collaboration experiment – theory.
- Next: PSRI09 in May 09 at DESY!

## Support addresses:

- [anacentre-mc@desy.de](mailto:anacentre-mc@desy.de)
- [anacentre-statistics@...](mailto:anacentre-statistics@...)
- [anacentre-pdf@...](mailto:anacentre-pdf@...)

## “Theoretician of the week”?

to educate experimentalists and to improve communication exp-theo.

## Opportunities in the groups:

- Present and discuss your work with broader audience.
- Work on interesting projects.
- Spend time at DESY?

Many more ideas for education events, expert workshops, issues to work on around. Challenge: Motivating people!  
Good chances for Analysis Centre to grow into central role!





# THE ANALYSIS CENTRE: CHALLENGES

- > Analysis Centre has potential to be clear benefit to LHC and ILC analyses in Germany.
- > It is a dynamic and constantly changing environment, with sometimes difficult boundary conditions, e.g.
  - experiment-specific vs. cross-experiment topics
  - information transfer between experiments
  - danger of doubling information, structure, and efforts.
  - time scale of Alliance
- > Analysis Centre has to show that a real added value is created for the physics groups – a challenge we hope to meet over the next few years.

