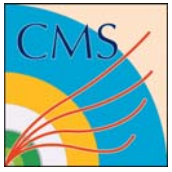
Supersymmetry at the Terascale

Isabell-A. Melzer-Pellmann

“Helmholtz-Hochschul-Nachwuchsgruppe“ at DESY
in Co-operation with the Hamburg University (5 years)



Goals of the Young Investigator Group

- Search for Supersymmetry at CMS
  - Optimisation of search strategies and data analysis
    - SUSY found?
      - comparison of different models
    - SUSY not found?
      - Setting of exclusion limits
      - Search for other physics beyond the Standard Model

- Studies for future experiments
  - LHC-Upgrade (CMS hadron calorimeter)
  - Detector optimisation for the International Linear Collider

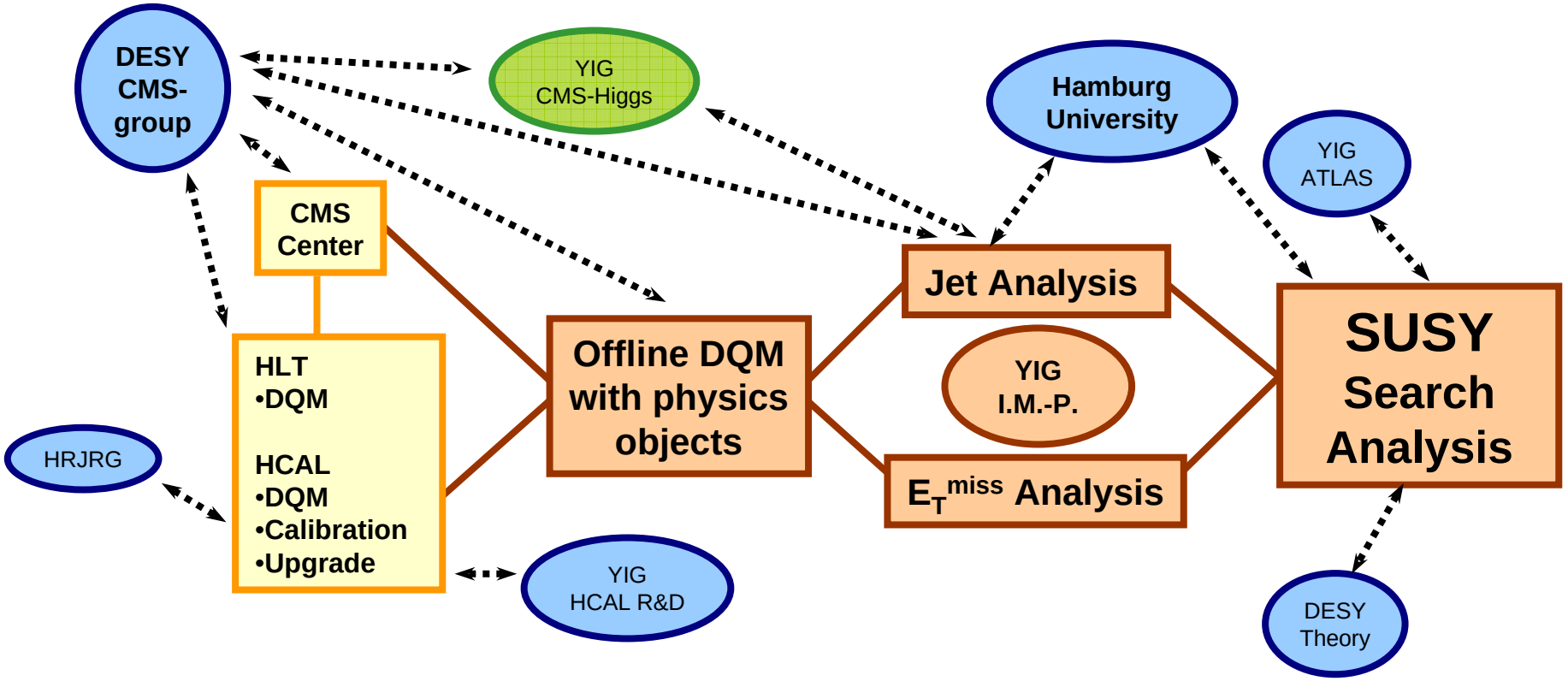
Roadmap

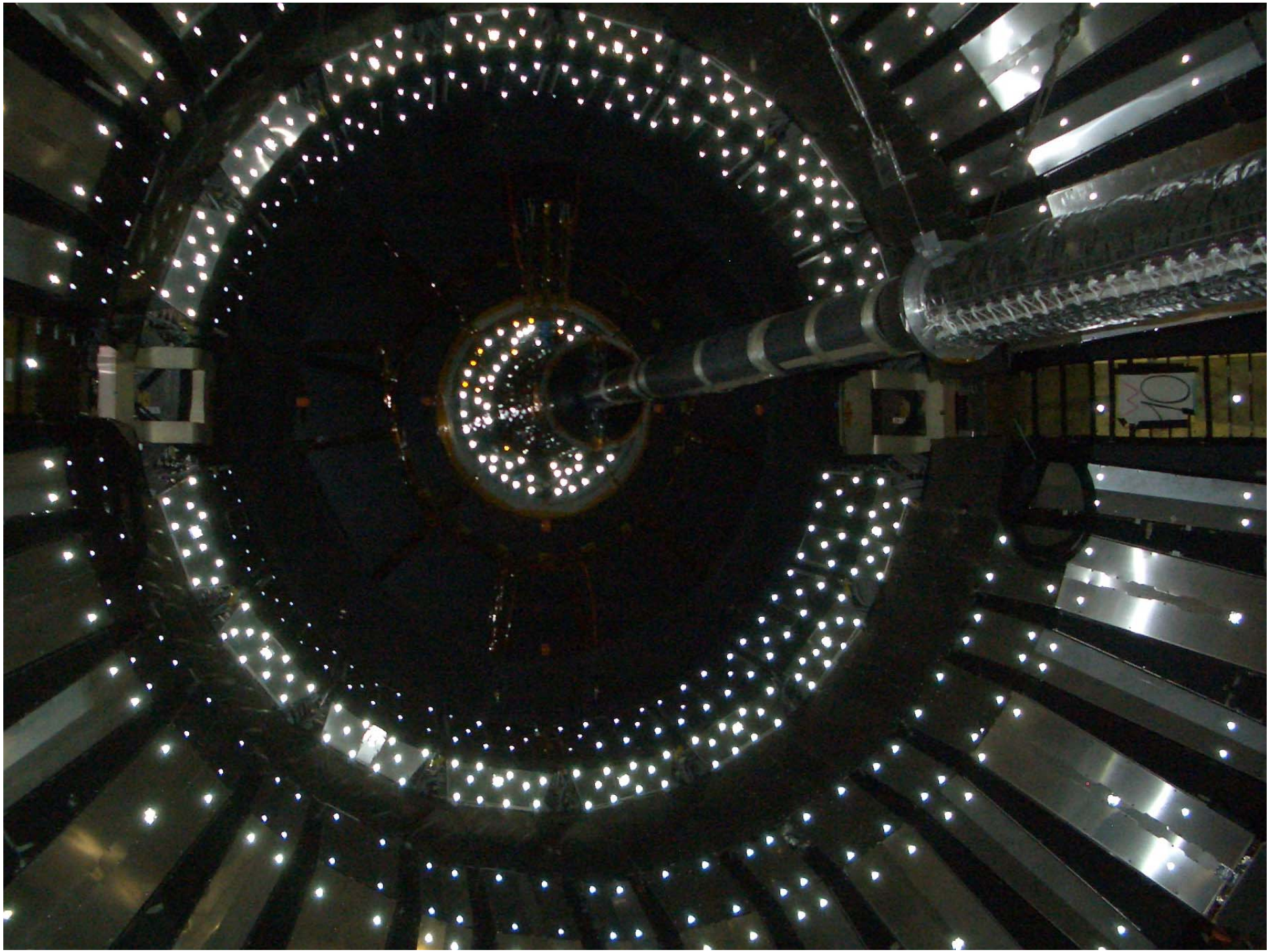
- Data analysis:
  - High energetic jets
  - Missing energy
  - Leptons (esp. myons)
  - ☛ Search for a very small signal below high QCD background

Co-operation with the Hamburg University

- CMS contribution:
  - Development of offline DQM tools (DQM) based on physics objects (use of the “express line” reconstruction)
  - Studies for the upgrade of the HCAL
  - Shifts at DESY (CMS Center) and CERN
- Group structure:
  - Group leader (I.M.-P.), 2 Postdocs, 2 PhD students

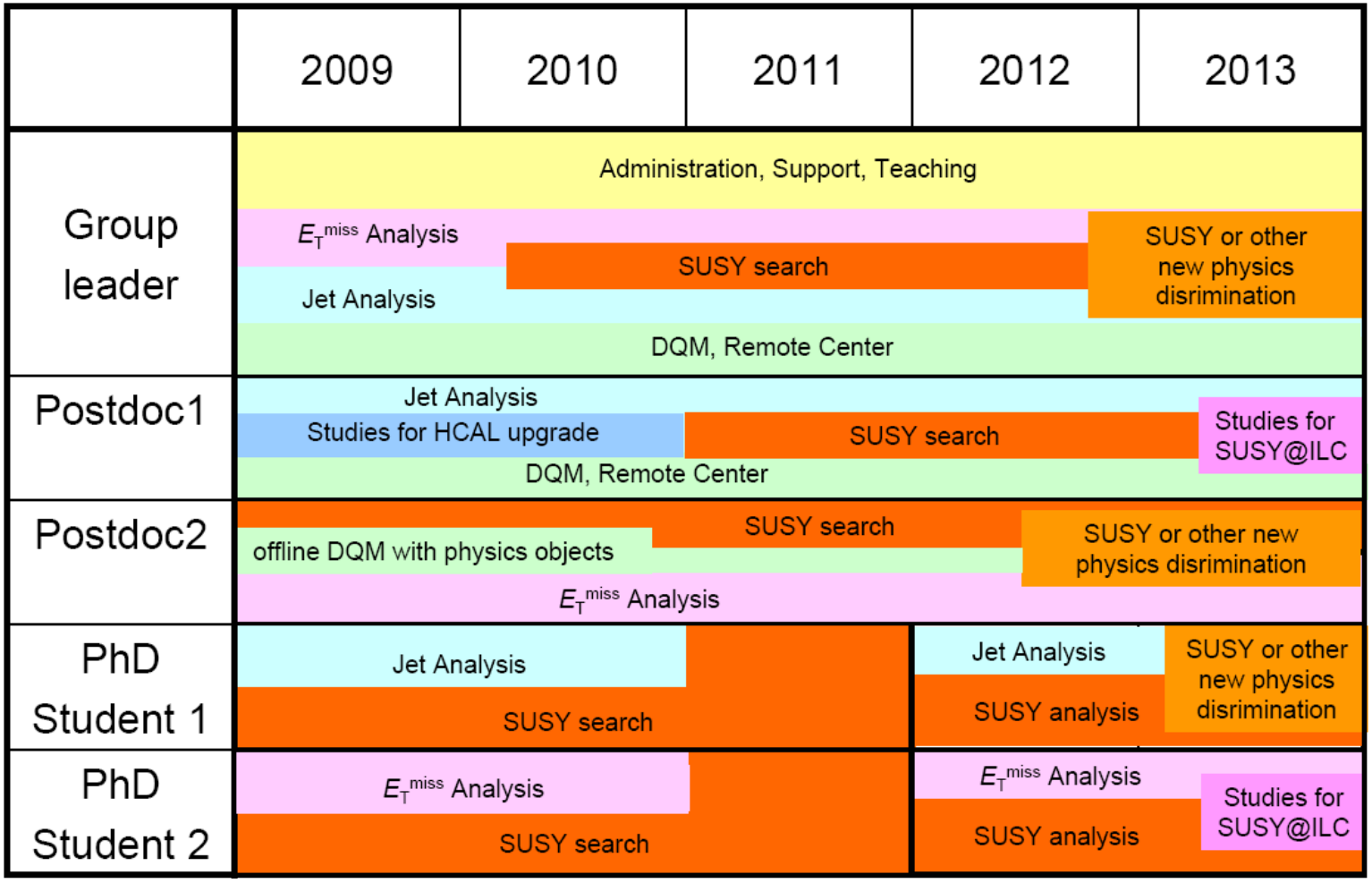
Networking


DESY CMS-group
YIG CMS-Higgs
Hamburg University
YIG ATLAS
CMS Center
Jet Analysis
SUSY Search Analysis
HLT
•DQM
HCAL
•DQM
•Calibration
•Upgrade
Offline DQM with physics objects
YIG I.M.-P.
HRJRG
E_T^{miss} Analysis
YIG HCAL R&D
DESY Theory



Backup

Zeitplan


2009
2010
2011
2012
2013
Group leader
Administration, Support, Teaching
E_T^{miss} Analysis
SUSY search
SUSY or other new physics disrimination
Jet Analysis
DQM, Remote Center
Postdoc1
Jet Analysis
Studies for HCAL upgrade
SUSY search
Studies for SUSY@ILC
DQM, Remote Center
Postdoc2
SUSY search
offline DQM with physics objects
SUSY or other new physics disrimination
E_T^{miss} Analysis
PhD Student 1
Jet Analysis
SUSY search
Jet Analysis
SUSY analysis
SUSY or other new physics disrimination
PhD Student 2
E_T^{miss} Analysis
SUSY search
E_T^{miss} Analysis
SUSY analysis
Studies for SUSY@ILC

SUSY-Analysen

- Jets + E_T^{miss} + 2 (gleich geladene) Myonen
  - relativ einfacher Trigger
  - kein großer QCD-Untergrund
  - Produktion durch Gluinos oder Squarks
- Jets + E_T^{miss} + 1 Myon
  - relativ saubere Signatur durch Myon
  - Trigger muss verstanden sein (schwierig am Anfang)
  - Untergrund: QCD-Ereignisse mit Jets, t-Quark Produktion, elektroschwache Bosonproduktion
- Jets + E_T^{miss} + 2 (unterschiedlich geladene) Myonen
  - charakteristische Verteilung der invarianten Masse der beiden Myonen