

## Annual Report

<b>Funding Programme:</b>	Helmholtz Young Investigators Groups
<b>Project ID No.:</b>	VH-NG-503
<b>Project Title:</b>	Probing Electroweak Symmetry Breaking at LHC : Higgs Physics with the CMS Detector
<b>Group Leader:</b>	Dr. Alexei Raspereza
<b>Helmholtz Centre:</b>	DESY
<b>Participating University:</b>	Karlsruhe Institute of Technology
<b>Report Period:</b>	01/04/2012 – 31/03/2013

### 1) Group Structure

*Please report briefly on the structure and personnel development of your group.*

Group Leader : Dr. Alexei Raspereza  
 YIG Members : Dr. Roberval Walsh (postdoc), Agni Bethani (Ph.D. Student), Armin Burgmeier (Ph.D. Student)  
 Associate members : Prof. Wolfgang Lohmann (staff), Dr. Rainer Mankel (staff), Dr. Joerg Behr (postdoc), Luigi Calligaris (Ph.D. Student), Jakob Salfeld Nebgen (Ph.D. Student), Igor Marfin (Ph.D. student)

### 2) Network

*Please describe how you / your research group are integrated within the Helmholtz Centre and the partner university (e.g. as member of committees).*

The leader of the group together with Prof. Georg Weiglein leads DESY SFB Project B9 „Probing the physics of electroweak symmetry breaking with results from LHC“.

### 3) Satisfaction

*How satisfied are you with the general working conditions provided by the Helmholtz Centre / partner university? Is there anything that meets your criticism?*

I'm satisfied with the working conditions provided by the Helmholtz Centre and partner university.

### 4) Scientific Progress / Milestones

*How has your work plan progressed? Which important milestones could be achieved during the report period? Is the progress of your work in accordance with original planning or has the work plan been changed?*

The Young Investigators Group contributed with the analysis searching for Higgs decays into tau leptons to the landmark paper by CMS Collaboration on a discovery of a new boson published in the journal Physics Letters B. Another essential scientific contribution of the group was the paper, reporting results of the searches for Supersymmetric Higgs bosons in the decays to b quarks at the LHC. The paper has been accepted for publication in Physics Letters B. Finally, group contributed to the operations of the CMS beam condition monitor, a device which ensured reliable and safe performance of the CMS detector in the harsh radiation conditions.

### 5) Financial Plan / Time Schedule

*Can you comply with the financial plan and time schedule or do you see a need for adjustment?*

Yes

<b>6) Status</b> <i>Do you hold a joint Junior Professorship or a W2/W3 Professorship? Do you aim for such a position? What is the status of your negotiations in this respect?</i>
No
<b>7) Teaching Activities of the Group Leader</b>
Together with Prof. Guenter Quast the group leader gives a lecture course "Higgs Physics" at the Karlsruhe Institute of Technology.
<b>8) Publications of the Group</b>
1) "Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC", CMS Collaboration, Phys. Lett. B 716 (2012) 30-61. 2) "Search for a Higgs boson decaying into a b-quark pair and produced in association with b quarks in proton-proton collisions at 7 TeV", CMS Collaboration, arXiv : 1302.2892, accepted by Phys. Lett. B. 3) "Search for MSSM Neutral Higgs Bosons Decaying to Tau Pairs in pp Collisions", CMS Collaboration, CMS Physics Analysis Summary HIG-12-050. 4) "Search for the Standard Model Higgs Boson Decaying to Tau Pairs in pp Collisions at 7 and 8 TeV", CMS Collaboration, CMS Physics Analysis Summary HIG-13-004.
<b>9) External Funding</b>
No
<b>10) Patent Applications</b> <i>No. of pending/granted patents</i>
No
<b>11) Awards received by Group Members / Professorship Appointments offered to Group Leader</b>
No