

## Helmholtz Young Investigator Groups – Annual Report

**Disclaimer:** The questionnaire is provided in English and can also be filled out in German.

**All form fields with a red frame are mandatory and need to be filled out.**  
(If you cannot make an entry, please enter “-” or “n/a”.)

Core data		
Funding program	Helmholtz Young Investigator Groups	
Project ID number	VH-NG- 1202	
Project title	Identifying the Sources of High-Energy Neutrinos with Multi-Messe	
Name of reporting person	Anna Franckowiak	
Helmholtz Center	DESY	
Partner university	HU Berlin	
Helmholtz research field	Matter and the Universe	
Reporting period [dd.mm.yyyy – dd.mm.yyyy]	01.01.2019 - 31.12.2019	
Number and length of cost-neutral extensions of the project (if applicable)	-	
Annual installment (reporting year)	Reference value (in EUR)	Actual value (in EUR)
Share of the Initiative and Networking Fund	150000	197.468,22
Share of the Helmholtz Center	174500	147.838,67

1	How do you assess the utilization of the current allocated annual installment until the end of the year? (forecast)
Code	Item
V1.1	<p>I am planning to use 324.500 EUR of this year's allocated planned installment.</p> <p>(The planned annual installments are listed in the contract, which was concluded between the Helmholtz Association and the Helmholtz Center.)</p>

2	Please explain last year's expenses with regard to the following categories:
Code	Item
V2.1	<p>Investment costs:</p> <p>-</p>
V2.2	<p>Personnel costs:</p> <p>PI's position:</p> <p>Postdocs:</p> <p>Ludwig Rauch (Jan. 2019 - Juli 2019)</p> <p>Vaidehi Paliya (Jan. 2019 - Dec. 2019)</p> <p>Xavier Rodrigues (Oct. 2019 - Dec. 2019)</p> <p>PhD Students:</p> <p>Robert Stein (Jan. - Dec. 2019, 66% position)</p> <p>Simone Garrappa (Jan. - Dec. 2019, 66% position)</p>
V2.3	<p>General expenses/material costs:</p> <p>Travel costs: 24.361,99</p> <p>Computers: 2331,25</p>

3 How do you rate the following aspects?						
Code	Item	I fully agree	I agree	I partially agree	I agree less	I do not agree
V3.1	My research group has reached full development.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V3.2	I am well connected with my university partner.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V3.3	The status of my career development corresponds to my vision.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V3.4	I am satisfied with my overall situation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V3.4C	Please list positive or critical aspects, if applicable:					
V3.5	The working progress of my research group is according to my schedule.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V3.6	The promises of the Helmholtz Center, e. g. regarding access to technology and infrastructure, financial independence, personnel responsibility are being kept.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V3.6C	Please list positive or critical aspects, if applicable:					

4 How do you assess the independence of your research group?			
Code	Item	Yes	No
V4.1	I can freely decide on the budget allocated to me as per the application.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
V4.2	I continue to develop my research agenda autonomously.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
V4.3	I make my own personnel decisions.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

5	How do you assess the progress of the project?		
Code	Item	Yes	No
V5.1	Compliance with the timeline as described in the proposal	<input checked="" type="checkbox"/>	<input type="checkbox"/>
V5.1C	In case you deviated from the timeline, please give a brief explanation:		
V5.2	Achievement of important milestones in line with the proposal	<input checked="" type="checkbox"/>	<input type="checkbox"/>
V5.2C	In case milestones have not been reached, please give a brief explanation:		
V5.3	Compliance with the financial plan as described in the proposal	<input checked="" type="checkbox"/>	<input type="checkbox"/>
V5.3C	If changes to the financial plan have occurred, please give a brief explanation:		

6	Please describe the scientific progress of the project in the reporting year along the individual work packages.
Code	Item
V6.1	<p><b>Max. one page</b></p> <p><b>WP 1: Real-time Neutrino Analysis</b>  New PhD student, Cristina Lagunas, started working on studying systematic uncertainties and their effects on the event reconstruction. Cristina and another PhD student, Robert Stein, continued to work on further automatizing the real-time neutrino program. Both of them work as IceCube real-time shifters, which resulted in several GCN messages.</p> <p><b>WP 2: Discovery and Identification of Optical Transients with ZTF</b>  A new PhD student, Simeon Reusch, started working on the optical follow-up software for neutrino and gravitational wave events. He automated and implemented new features in the candidate selection with the AMPEL software package. He took over this work from Robert Stein. Several GCN and ATels were written reporting the results. One exciting event was discovered: the tidal disruption events AT2019dsg as potential counterpart to a high-energy neutrino. We are finalizing the publication, lead by Robert Stein, which we are planning to submit to Nature.  Simeon implemented a forced photometry pipeline for ZTF data, which is widely used by the collaboration.  Several proposals for spectroscopic follow-up observations of potential neutrino counterparts have been prepared. A collaboration with astronomers in Stockholm grants us access to spectroscopy with the Nordic Optical Telescope (NOT).</p> <p><b>WP 3: Stacking Analysis using Archival Multi-Wavelength Data Sets</b>  – WP 3.1: Search for Neutrinos from SNe  A master student Jannis Necker studies the latest sample of ZTF supernova and works on estimating the explosion time, which is a crucial input to the neutrino stacking analysis. First progress has been made using simulated data.</p> <p>– WP 3.2: Search for Neutrinos from AGN flares  PhD student Simone Garrappa compiled a sample of 200 well-sampled gamma-ray AGN light curves. The variability study of those sources will result in a publication by itself. In a second step it will be used as input for a targeted time-dependent neutrino search from all sources. Postdoc Vaidehi Paliya investigated an X-ray flaring AGN, which was found in spatial coincidence with a high-energy neutrinos. He collaborated with a theorist in South Africa to model the electro-magnetic and neutrino data. Results are submitted to ApJ.  Postdoc Shan Gao is working on improving his numerical modeling code for AGN. The computational time per run was reduced by almost an order of magnitude, which will enable us to run the modeling on few hundred sources and predict neutrino emission as an input for a neutrino stacking analysis. Xavier Rodrigues focused on the application of the modeling to a potential neutrino emitting blazar, which is among the brightest known gamma-ray sources. This will be the first step to apply the code to a large sample of sources.</p> <p>– WP 3.3: Search for Neutrinos from TDEs  Preliminary results of a TDE neutrino stacking analysis were presented by Robert Stein at the international cosmic-ray conference. An update with the full ZTF sample which doubled the number of detected TDEs is in preparation. A single interesting TDE AT2019dsg was identified (see above).</p>

7 How do you assess your career development and networking with the university?			
Code	Item	Yes	No
V7.1	I work closely together with the university and its structures (e.g. integration into the faculty council, doctoral procedures).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
V7.2	I am gaining teaching experience.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
V7.2C	If yes, please indicate the number of semester hours per week: 4		
V7.3	I am appointed to a joint junior professorship.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
V7.4	I am appointed to a joint W2/W3 professorship.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
V7.5	I have an option for permanent employment ("tenure").	<input checked="" type="checkbox"/>	<input type="checkbox"/>
V7.6	Please describe your foreseeable or planned future career prospects: Leading Scientist at DESY or W3 professor at University		
V7.7	I have taken advantage of the employer's support for family phases.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
V7.8	Please describe your current function within the Helmholtz Center (position description): tenured staff scientist		
V7.9	Please describe your current function within the university (e. g. also as a committee member): giving lectures, part of several master and PhD thesis committees received "Ruf" for W3 position at Ruhr-Universitaet Bochum to start Oct. 2020		
V7.10	Please indicate the current status of networking with other actors (multiple answers possible): <input checked="" type="checkbox"/> Cooperations at the partner university <input checked="" type="checkbox"/> Cooperations with other universities in Germany <input checked="" type="checkbox"/> Cooperations with universities abroad <input type="checkbox"/> Cooperations with other non-academic research institutions in Germany <input type="checkbox"/> Cooperations with non-academic research institutions abroad <input type="checkbox"/> Cooperations with companies <input type="checkbox"/> Cooperations with other organisations, namely		

8 Please describe the current output of your group.			
Code	Item	Amount / total sum	N/a
V8.1	Peer-reviewed publications in the reporting year	8	<input type="checkbox"/>
V8.2	Registered patents in the reporting year	-	<input type="checkbox"/>
V8.3	Spin-offs in the reporting year	-	<input type="checkbox"/>
V8.4	Acquisition of third-party funding in the reporting year (please mention the type and amount of funding as well as the involved persons): 50% PhD position through Helmholtz Weizmann Research School		<input type="checkbox"/>
V8.5	Awards and recognitions (please include the names of the respective persons): Winner of DESY-wide science slam (Robert Stein) IceCube analysis coordinator (Anna Franckowiak) Fermi-LAT AGN coordinator (Vaidehi Paliya)	3	<input type="checkbox"/>
V8.6	Please describe which activities you have carried out in the area of knowledge and technology transfer: public outreach: presentations for students and teachers at DESY, for disadvantaged students in townships in Capetown (supported by the IAU), talk at planetarium	5	<input type="checkbox"/>

9 How do you assess the personnel development measures and qualification? (Helmholtz Academy)				
Code	Item	Yes	No	N/a
V9.1	Have you fully attended the course “Leading Your Group”?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V9.2	Have you implemented the acquired personnel development measures and the qualification plan?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V9.3	Have you been assigned a permanent contact person?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
V9.4	Did you have opportunities for discussions with the institute management to reflect on your own development and career planning?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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