

# Helmholtz Call for 2019 CSC Fellowship Applicants

**Helmholtz Centre:** Forschungszentrum Jülich GmbH – [www.fz-juelich.de](http://www.fz-juelich.de)

**Department/Institute:** Institute of Energy and Climate Research, Photovoltaics (IEK-5)  
[http://www.fz-juelich.de/iek/iek-5/EN/Home/home\\_node.html](http://www.fz-juelich.de/iek/iek-5/EN/Home/home_node.html)

**Supervising scientist:** Prof. Dr. Thomas Kirchartz

**Research Field:** Photovoltaics

**Position:** PostDoc  Visiting Scholar

**Research Area:**

Solar cells made from lead-halide based perovskites have been shown to enable efficiencies > 20 % using a solution-based fabrication process. However, the materials currently lack stability and are insufficiently well understood in many respects related to electrostatics and charge carrier recombination in these materials. We are looking for candidates that support our research efforts on fabricating and characterizing layers of lead-halide perovskites. In particular, we are interested in improving material stability e.g. by using stable methyl-ammonium-free combinations of cations. In addition to quality and stability of the active layer, we are also interested in band gap tuning for tandem applications as well as tuning of interfacial layers for increased open-circuit voltages and fill factors. Characterization of solar cells and films using transient and steady-state photoluminescence methods will be used to better understand the losses due to recombination and due to resistive effects. Depending on the profile of the applicant a slightly different focus of the project is possible and candidates with a background in

**Specific Requirements:**

The successful candidate should have a background in physics, chemistry, materials science or electrical engineering and be familiar with the fabrication and characterization of semiconductor devices and semiconducting materials (ideally solar cells).

**Funding:** CSC-scholarships will be increased by hosting institution (500 €month and costs for health, emergency-call and liability insurance (50 €))

**Duration of stay:** 2 years

**Work Place:** Forschungszentrum Jülich, Germany (near Cologne)

**Earliest Start:** September 2019

**Language Requirement:** Excellent command of English, written and spoken. A German language course will be offered parallel to the project.

**Name and Address of the Supervisor:** Prof. Thomas Kirchartz, Forschungszentrum Jülich, Institute of Energy and Climate Research (IEK-5), 52425 Jülich, Germany; [t.kirchartz@fz-juelich.de](mailto:t.kirchartz@fz-juelich.de)

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**Helmholtz Centre:** Forschungszentrum Juelich GmbH – [www.fz-juelich.de](http://www.fz-juelich.de)

**Department/Institute:** Institute of Energy and Climate Research, Troposphere (IEK-8)  
[http://www.fz-juelich.de/iek/iek-8/EN/Home/home\\_node.html](http://www.fz-juelich.de/iek/iek-8/EN/Home/home_node.html)

**Supervising scientist:** Prof. Dr. Thomas F. Mentel

**Research Field:** Aerosol monitoring

**Position:** PostDoc  Visiting Scholar

## Research Area:

Aerosol cloud interactions (ACI) are the largest uncertainties in understanding radiative balance of the Earth, leading to large obstacles for the predictive power of climate models. In Jülich we are in the unique situation to have a Meteorological tower on the site and the continuously operating Jülich Observatory for Cloud Evolution (JOYCE). We are operating an aerosol mass spectrometer, aerosol size distribution and cloud condensation nuclei measurements at our Meteorological tower at three heights. The goal is to provide long term observations of aerosol properties over several seasonal cycles, for a unique comparison of the in-situ microphysical and composition data with cloud data retrieved from remote sensing. The magnitude of the response of clouds to aerosol will be calculated via ACI by looking at the change of optical depth, cloud number concentration and liquid water path with aerosol parameters on a statistical basis. Moreover, the closure between in-situ and remote sensing observation will be tested. The project will contribute to parameterization of the role of size distribution and microphysics in cloud formation and improved treatment of aerosol-cloud interaction in atmospheric models.

## Specific Requirements:

- PhD degree in physics, chemistry, environmental sciences or a related field
- Programming and statistical analysis of field data
- Knowledge about (aerosol) mass spectrometry is advantageous
- Interest in meteorology is welcome
- Willingness to cooperate in teams

**Funding:** CSC-scholarships will be increased by hosting institution (500 €month and costs for health, emergency-call and liability insurance (50 €))

**Duration of stay:** 2 years

**Work Place:** Forschungszentrum Juelich, GmbH (near Cologne)

**Earliest Start:** September 2019

**Language Requirement:** Excellent command of English, written and spoken. A German language course will be offered parallel to the project.

**Name and Address of the Supervisor:** Prof. Dr. Thomas F. Mentel, Forschungszentrum Jülich, Institute of Energy and Climate Research (IEK-8), 52425 Juelich, Germany; E-mail: [t.mentel@fz-juelich.de](mailto:t.mentel@fz-juelich.de)

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**Helmholtz Centre:** Forschungszentrum Jülich GmbH – [www.fz-juelich.de](http://www.fz-juelich.de)

**Department/Institute:** INM-9/IAS-5 Computational Biomedicine  
[http://www.fz-juelich.de/ias/ias-5/EN/Home/home\\_node.html](http://www.fz-juelich.de/ias/ias-5/EN/Home/home_node.html)

**Supervising scientist:** Jr.-Prof. Dr. Mercedes Alfonso-Prieto

**Research Field:** Modeling and Simulation of Protein-Protein Complexes

**Position:** PostDoc  Visiting Scholar

**Research Area:**

Cellular functions are not carried out by individual proteins, but rather by an extensive network of protein-protein complexes. These protein-protein interactions play essential roles in signaling cascades, intracellular transport and regulatory processes. Moreover, the same protein can have different interacting partners, thus increasing the number of possible functional roles. Hence, mutations located at protein-protein interfaces result in wide range of diseases. Understanding the function and dysfunction of these protein-protein complexes requires their structural characterization, as well as mapping of the disease-associated mutations. Unfortunately, there are still ~30,000 complexes (~80%) for which experimental high resolution structures are still missing. This gap can be filled by data-driven computational approaches that integrate several experimental inputs (such as mutagenesis and crosslinking experiments) with protein-protein docking and molecular dynamics simulations. The project will involve the use of state-of-the-art computational techniques for modeling and simulation of protein-protein complexes.

**Specific Requirements:**

The suitable candidate for this position is an outstanding, motivated young scientist, who holds a PhD in Chemistry, Biochemistry, Bioinformatics, Physics or related disciplines. Preference will be given to candidates with background experience in the computational tools to be used in the project, i.e. protein structural bioinformatics (homology modeling and protein-protein docking) and/or molecular dynamics simulations. The suitable candidate should be willing to work in an international and interdisciplinary team, as well as to assume responsibility and carry independent work. Since the project involves interdisciplinary cooperation with several research institutes, good communication and organisational skills are essential.

**Funding:** CSC-scholarships will be increased by hosting institution (500 €month and costs for health, emergency-call and liability insurance (50 €))

**Duration of stay:** 24 months

**Work Place:** Forschungszentrum Jülich, Germany (near Cologne)

**Earliest Start:** October 2019

**Language Requirement:** Excellent command of English, written and oral. A German language course will be offered parallel to the project.

**Name and Address of the Supervisor:** Dr. Mercedes Alfonso-Prieto, Forschungszentrum Jülich, Institute for Advanced Simulations (IAS), Computational Biomedicine (IAS-5 / INM-9), 52425 Jülich, Germany; [m.alfonso-prieto@fz-juelich.de](mailto:m.alfonso-prieto@fz-juelich.de)

# Helmholtz Call for 2019 CSC Fellowship Applicants

**Helmholtz Centre:** Forschungszentrum Jülich GmbH – [www.fz-juelich.de](http://www.fz-juelich.de)

**Department/Institute:** Institute for Advanced Simulations (IAS), Computational Biomedicine (IAS-5 / INM-9)

**Supervising scientist:** Dr. Vania Calandrini

**Research Field:** Modeling Neuronal Information Processing

**Position:** PostDoc  Visiting Scholar

**Research Area:** Neurotransmission is driven by molecular signaling cascades, mediating very complex processes, such as memory, learning, mood etc. These signaling processes involve tens to hundreds of molecules (proteins, neurotransmitters, chemicals) in highly crowded environments, such as cell membrane and cytosol, that have to diffuse, meet and interact at the correct time at the correct place. Knowing how key physicochemical features, such as compartmentalization, membrane composition, diffusion processes, mutations, crowding or electric fields, combine together and shape over time and space neuronal signaling would provide important hints on the human brain functioning. The postdoc will dissect the interplay among these aspects through the implementation of a mesoscale stochastic model of collective phenomena relevant to neuronal cascades using mean-field-like approaches based on statistical mechanics methods and higher-resolution forcefield-based deterministic simulations.

## Specific Requirements:

We encourage applications from candidates with a PhD degree in Physics (preferred), Chemistry, Applied Mathematics, or Computational sciences. We are seeking for a candidate familiar with Brownian dynamics and/or molecular dynamics simulation methods applied to biophysical systems, soft matter, or statistical mechanics problems, and with a strong interest in simulation and theoretical work in statistical physics. Teamwork attitude and ability to communicate effectively in English are required.

**Funding:** CSC-scholarships will be increased by hosting institution (500 €month and costs for health, emergency-call and liability insurance (50 €))

**Duration of stay:** 24 months

**Work Place:** INM-9/IAS-5, Forschungszentrum Jülich

**Earliest Start:** October 2019

**Language Requirement:** Excellent command of English language, written and verbal. A German language course will be offered parallel to the project.

**Name and Address of the Supervisor:** Dr. Vania Calandrini, Forschungszentrum Jülich, IAS-5 / INM-9 Computational Biomedicine, 52425 Jülich, Germany; [v.calandrini@fz-juelich.de](mailto:v.calandrini@fz-juelich.de)

## Helmholtz Call for 2019 CSC Fellowship Applicants

**Helmholtz Centre:** Forschungszentrum Juelich GmbH – [www.fz-juelich.de](http://www.fz-juelich.de)

**Department/Institute:** Institute of Neuroscience and Medicine, Molecular Organization of the brain (INM-2)  
[http://www.fz-juelich.de/inm/inm-2/EN/Home/home\\_node.html](http://www.fz-juelich.de/inm/inm-2/EN/Home/home_node.html)

**Supervising scientist:** Dr. Simone Beer

**Research Field:** Molecular Neuroimaging

**Position:** PostDoc X  Visiting Scholar

**Research Area:**

Our research interests involve the methodology for *in vivo* receptor imaging of brain functions with positron emission tomography (PET) and the combination with complementary imaging modalities like CT and MRI, including amongst others

- the development and validation of software algorithms and correction methods for high quality image reconstruction,
- strategies to improve image quantitation accuracy,
- development of novel instrumentation for dedicated applications,
- simulation and modelling of PET components and systems.

The objective of the research project is to optimize image quality and quantification accuracy for low statistics brain PET scans by means of including prior information into the image reconstruction algorithm.

### Specific Requirements:

We are seeking bright, highly motivated and enthusiastic candidates with a degree in Physics, Mathematics, Computational Science or related disciplines. The candidates should be able to work in an interdisciplinary and international research team. Experience in programming (C++, Matlab, Python) will be an advantage.

**Funding:** CSC-scholarships will be increased by hosting institution (500 €month and costs for health, emergency-call and liability insurance (50 €))

**Duration of stay:** 2 years

**Work Place:** Forschungszentrum Jülich, Germany (near Cologne)

**Earliest Start:** November 2019

**Language Requirement:** Very good knowledge of English language, written and spoken. A German language course will be offered parallel to the project.

**Name and Address of the Supervisor:** Dr. Simone Beer, Forschungszentrum Jülich, Institute of Neuroscience and Medicine (INM-2), Forschungszentrum Juelich, 52425 Juelich, Germany, [si.beer@fz-juelich.de](mailto:si.beer@fz-juelich.de)

## Helmholtz Call for 2019 CSC Fellowship Applicants

**Helmholtz Centre:** Forschungszentrum Jülich GmbH – [www.fz-juelich.de](http://www.fz-juelich.de)

**Department/Institute:** Institute of Complex Systems, Structural Biochemistry (ICS-6)  
[http://www.fz-juelich.de/ics/ics-6/EN/Home/home\\_node.html](http://www.fz-juelich.de/ics/ics-6/EN/Home/home_node.html)

**Supervising scientist:** Dr. Oliver Bannach

**Research Field:** Alzheimer's Diagnostics

**Position:** PostDoc  Visiting Scholar

**Research Area:**

Biomarkers which reflect basic pathological processes of Alzheimer's disease (AD) are of utmost importance regarding early diagnostics and therapy monitoring. Since Amyloid  $\beta$  ( $A\beta$ ) aggregates are a hallmark of AD, they are probably the most direct and reliable biomarker for AD. At our institute we established an ultra-sensitive assay for diagnostics of AD, designated surface-based fluorescence intensity distribution analysis (sFIDA). Scope of this project is the development of sFIDA towards a blood-based diagnostic test for AD.

**Specific Requirements:**

- PhD in the field of Chemistry or Biochemistry
- Strong expertise glass surface and/or nanoparticle chemistry
- Expertise in quantitative image data analysis and statistics
- Knowledge in development of diagnostic assays
- Affinity to automated technologies
- IT knowledge, basic programming skills
- Working compliant to ISO 9001 and ISO 13485

**Funding:** CSC-scholarships will be increased by hosting institution (500 €month and costs for health, emergency-call and liability insurance (50 €))

**Duration of stay:** 2 years

**Work Place:** Forschungszentrum Jülich, Germany (near Cologne)

**Earliest Start:** September 2019

**Language Requirement:** Very good knowledge of English language, written and spoken. A German language course will be offered parallel to the project.

**Name and Address of the Supervisor:** Dr. Oliver Bannach, Forschungszentrum Jülich, Institute of Complex Systems (ICS-6), 52425 Jülich, Germany, [o.bannach@fz-juelich.de](mailto:o.bannach@fz-juelich.de)

## Helmholtz Call for 2019 CSC Fellowship Applicants

**Helmholtz Centre:** Forschungszentrum Jülich GmbH – [www.fz-juelich.de](http://www.fz-juelich.de)  
**Department/Institute:** Institute of Neuroscience and Medicine (INM-9)/Institute for Advanced Simulation (IAS-5)  
[http://www.fz-juelich.de/ias/ias-5/EN/Home/home\\_node.html](http://www.fz-juelich.de/ias/ias-5/EN/Home/home_node.html)  
**Supervising scientist:** Junior Prof. Dr. Giulia Rossetti, Prof. Dr. Paolo Carloni, Prof. Luhua Lai ([lhilai@pku.edu.cn](mailto:lhilai@pku.edu.cn)),  
**Research Field:** Computer-aided Drug Design  
**Position:** PostDoc  Visiting Scholar

### Research Area:

Aggregation of the human  $\alpha$  synuclein (AS) protein is a hallmark of Parkinson's disease (PD) and other neurodegenerative disorders. Targeting AS with ligands is a very powerful strategy to counteract the neuronal derangement characterizing Parkinson's disease (PD). This poses, however, great challenges as AS is an Intrinsically Disordered Protein, lacking any tertiary structural feature. Here the Juelich team plans to adopt the "ligands clouds to protein clouds" computational approach developed in Luhua Lai's group to rationally develop ligands that bind the protein and inhibit protein fibril formation. The computations will be applied to our recently predicted ensemble of AS conformers (Rossetti et al, ChemPhysPhysChem 2016, 18, 5702).

### Specific Requirements:

#### Your Profile:

- PhD in Physics, Chemistry, Biology or a related field (required)
- Excellent knowledge of biomolecular simulation and/or computer-aided drug design (required)
- Good programming skills (preferred)
- Good spoken and written English skills (required)
- Communication and teamwork skills (preferred)

**Funding:** CSC-scholarships will be increased by the hosting institution (500 €/month and costs for health, emergency-call and liability insurance (50 €/month))

**Duration of stay:** 2 years

**Work Place:** Forschungszentrum Jülich, Germany (near Cologne)

**Earliest Start:** October 2019

**Language Requirement:** Excellent command of English, written and spoken. A German language course will be offered parallel to the project.

**Name and Address of the Supervisor:** Dr. Giulia Rossetti, Prof. Dr. Paolo Carloni, Forschungszentrum Jülich, Institute of Neuroscience and Medicine (INM-9)/Institute for Advanced Simulation (IAS-5) and Jülich Supercomputing Centre (JSC), 52425 Jülich, Germany  
[g.rossetti@fz-juelich.de](mailto:g.rossetti@fz-juelich.de); [p.carloni@fz-juelich.de](mailto:p.carloni@fz-juelich.de)