



**European Research Council**

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## **- Examples of ERC Starting grant projects 2013 -**

### **Physical Sciences and Engineering (PE)**

#### **Assessing tsunami impact on coastal cities**

Exposure to coastal floods is likely to increase to 150 million people and € 23 trillion in assets by 2070, with worst case climate change scenarios also predicting an increase in sea level rise. Recent events such as the Japan earthquake and tsunami have already demonstrated the vulnerability of urban regions, ports and nuclear plants to coastal floods. Tiziana Rossetto expects to fill the current gap in the engineering design of buildings and to provide guidance for insurance companies. No reliable method exists yet for the analysis of building resistance to tsunami onshore flows and very few cities worldwide have invested in shoreline defence to handle storm waves. This new ERC-funded project will allow creating a unique tsunami generator in a 100 meter flume, designed for testing and quantifying the effects of tsunami waves on built environments, the failure limits and the performance of coastal defences. (Tiziana Rossetto, University College London, UK)

#### **New nano photovoltaics with excellent light absorption**

The shift away from fossil fuels to renewable energy sources is an important trend of current climate change policies. Solar cells and the novel nano-enabled photovoltaics have thus an incomparable potential. Current data have shown that the existing technologies made of crystalline silicon and thin-film solar cells will not fulfil expectations for widespread use of solar energy. With his ERC grant, Erik C. Garnett will explore the benefits of nanowire photovoltaics to make low-cost solar cells a reality (superior light absorption and antireflection, tunable material properties, etc.). By combining synthetic chemistry with materials sciences, physics and device fabrication, the research team will focus on understanding and controlling the surface effects in nanostructures. The objectives are also to maximise the light absorption and carrier collection in ultrathin semiconductors ('solar highways') and assemble complex nanostructures with high precision on a massive scale. (Erik C. Garnett, FOM-AMOLF Institute, the Netherlands)

### **Life sciences (LS)**

#### **High-tech radiotherapy for Head-and-Neck cancer**

Head-and-Neck cancer (HNC) is one the main malignant tumours in Europe and is strongly associated with lifestyle and environmental factors. Despite major technological improvements in radiotherapy, only 50% of all HNC patients can be cured today. An important cause of this high rate of failure is the resistance caused by tumour hypoxia (oxygen deficit) and other clinical factors such as HPV (human papilloma virus). With her ERC grant, Daniela Thorwarth will use high precision radiotherapy technology to apply higher doses to the tumour without increased toxicity. By combining for the first time biological and genetic markers with functional imaging (PET and f-MRI scans), she expects to move from



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an anatomy-based approach to a biologically individualised radiotherapy. The second phase of her project will consist in clinical tests on patients (phase I and II).  
(Daniela Thorwarth, University Hospital Tübingen, Germany)

### **Real-time monitoring of air pollution in Andhra Pradesh**

Research conducted in high-income countries shows that air pollution can be the source of cardiovascular mortality. However, there is little evidence about the impact of fine particulate matter (PM) in low-income countries where concentrations are much higher, like India. Cathryn Tonne chose to investigate the cardiovascular health effects of exposure to PM in children and parents in Andhra Pradesh. She will use mobile monitoring of outdoor concentrations as well as real-time personal monitoring through GPS technology and life-logging image capture to identify specific activities and locations with important particle exposure (e.g. cooking under poor combustion and ventilation conditions, buses, etc.). Through her innovative approach, she hopes to address one of the key weaknesses in most air pollution epidemiology studies: capturing the complex exposure patterns in people's daily lives.

(Cathryn Tonne, London School of Hygiene and Tropical Medicine, UK)

## **Social Sciences and Humanities (SSH)**

### **Music, emotions and health**

Music is known for its incredible power on people's emotions; it lifts us out of depression or moves us to tears. The emotional power of music holds promises for therapeutic applications. By combining the use of new computer algorithms with cognitive neurosciences and psychology, Jean-Julien Aucouturier will create the first musical stimuli (voice and sounds) that selectively activate some neural mechanisms involved in the induction of emotions. For instance, it will be possible to create powerful and creative music that trembles like anxious voice or exults like joyful speech. High clinical impacts are also foreseen - e.g. in linguistic rehabilitation after strokes, or for modulating emotions unconsciously in patients with post-traumatic or affective disorders.

(Jean-Julien Aucouturier, CNRS, France)

### **Studies on sexual diversity offer hopes for LGBT rights**

The sociological literature has long focused on the heterosexual, monogamous and reproductive couples with little research exploring the non-conventional intimacy in Southern Europe – lesbians, gay men, bisexuals and transgendered people (LGBT). Ana Cristina Santos's team will conduct 6 cross national qualitative studies to examine the current strands of partnering, parenting and friendship in Spain, Portugal and Italy. Her objective is to draw up conclusions on the social, cultural and legal impacts of these changes in family life and intimacy. It could also shed new light on the wider range of personal and family models, the connection between practices and legal frameworks and on the way citizenship is to be understood in contemporary societies, including at an EU level.

(Ana Cristina Santos, Centre for Social Studies, University of Coimbra, Portugal)