# ESIPP Images of Research Competition

March – May 2019

# Winner
Cooling the Cloud - Jaakko McEvoy

This image shows a 1:1 scale model of a server blade, 3D printed out a fluorescent orange material and illuminated with laser light. As the green laser light hits the model it is absorbed by the orange material, which in turn emits light at a wavelength high enough to be filtered out. When viewed through a camera with the appropriate filter the model seems to disappear and so do the undesirable surface reflections, leaving only the air flow paths visible. Using flow a visualization method called Particle Image Velocimetry (PIV) the flow paths around component structures can now be easily studied. Optimization of air flow paths is key to reducing the high energy consumption of server fans and also in reducing noise. Data Centres (DC) are estimated to consume around 2.5-3.5% of the global electricity generated and are growing rapidly. In standard DC facilities up to a third of the entire power consumption can be attributed to inefficient cooling systems, equating to billions of dollars wasted on inefficient techniques as well as millions of metric tons of CO_2 emitted.
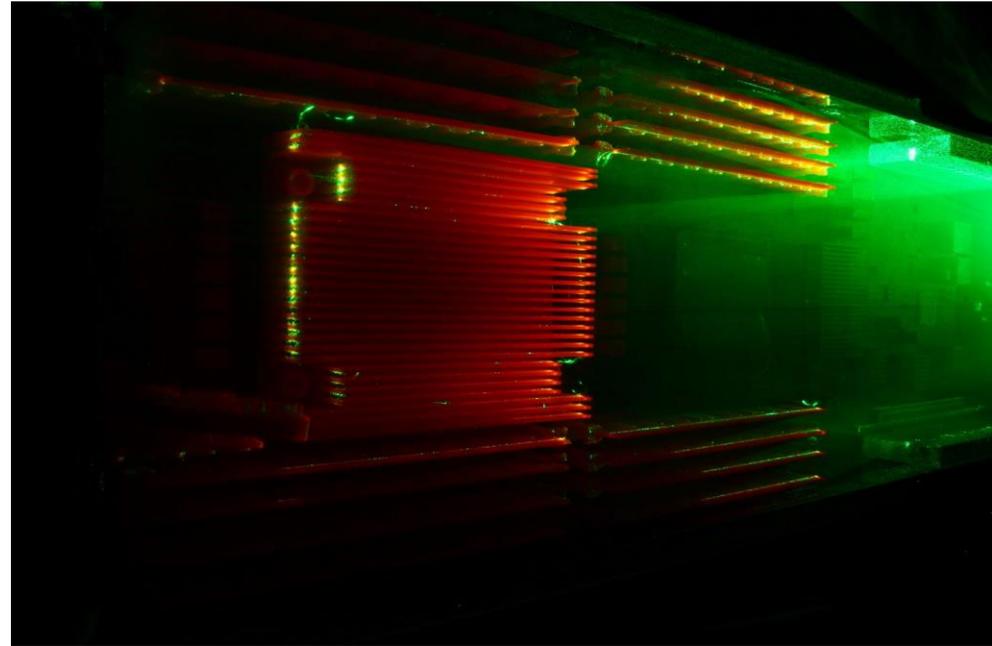
Second Place
Federico Caruso

This image shows the reconstruction of the flow field within a centrifugal waste-water pump through numerical methods (CFD). The rotation of the impeller (blue) inside a volute casing (grey) allows the fluid to be moved within the pump channels. The instantaneous velocity field is captured and represented through streamlines (cyan/green). Being tangent to the velocity vectors, the streamlines revolve around the wake (yellow) as result of the high velocity gradients downstream the impeller trailing edge.
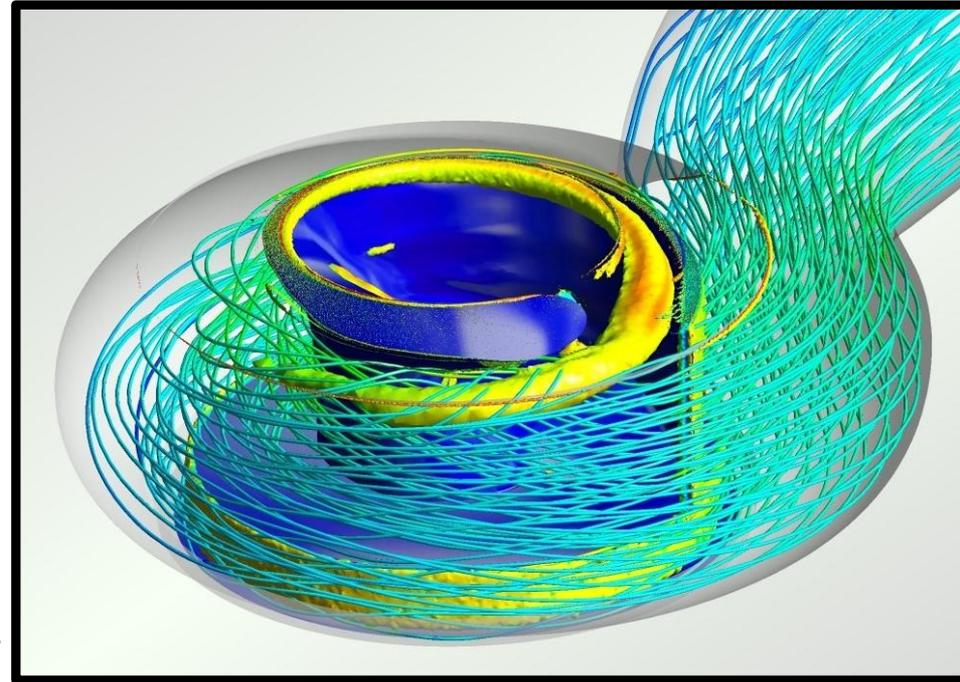
Third Place
Sunshine and shadows - **Eadaoin Doddy**

Where should we build our solar energy generation farms? The "sunny south east" has a higher capacity along with the eastern side of mountain ranges, especially noticeable are the Wicklow mountains. There is potential for solar energy generation in Ireland but finding the optimum location is important. This map shows the average solar energy capacity calculated using the irradiance from the MÉRA reanalysis dataset for the years 2000-2010. Building forecast maps of the solar energy capacity allows us to develop and advance the solar energy generation in Ireland.