

A PhD position available on
Laser Diagnostics of Turbulence

What is fluid flow? It is one of those things that everyone knows, until asked to define it precisely. Fluid flow transports mass, and energy, and momentum, all macroscopic, measurable quantities. But any fluid is built out of molecules. So follow the molecules, and you will find out the finest details of the flow. This, perhaps surprisingly, is not actually true: molecules have a life of their own and only on average go with the flow.

We have one PhD position available for the development of a particular experimental technique that gives the unique opportunity to study exactly this intricate relation between molecular motion and fluid flow. The technique, in its broadest sense, is called Molecular Tagging Velocimetry (MTV). By means of photophysical or photochemical processes, specific molecular distributions are labelled ('tagged') in a flow. After a while this distribution, modified by the fluid motion, is visualised, either by laser-induced fluorescence or by spontaneous emission. The local velocity is derived from the displacement and the time delay between creation of the markers and their visualisation. Several implementations of MTV have meanwhile been published, but all of them employ light molecules (like NO, or O₂). In strongly turbulent flows (in which we will apply this technique) the Brownian motion of these tracers smears out the finest details of the flow.

The 'core business' of the PhD student will be to test and devise new ways to create heavier tracer molecules, tag them, and trace them in a turbulent flow. This involves optics and lasers, as well as image processing for statistical data evaluation.

We seek an experimental physicist, preferably with a background in fluid mechanics or molecular physics. The available PhD position is financed by FOM, for a period of 4 years, and is based in the Applied Molecular Physics group at the Radboud University Nijmegen, in a brand new building with a brand new turbulence facility.

For more information contact Dr. Nico Dam (N.Dam@science.ru.nl; tel. +31 24 3653016).

Dr. Nico Dam
Radboud University of Nijmegen
Dept. of Applied Molecular Physics
Nijmegen
The Netherlands