

On behalf of the

**Science College CMS**  
**Vienna Computational Materials Laboratory**  
**and Center for Computational Materials Science**

we cordially invite you to the following seminar

**Dr. Julia Fornleitner**

Forschungszentrum Juelich GmbH, Germany

## **Mesoscopic Simulations on Leukocyte Migration**

Blood is a multicomponent mixture - it contains three types of cells, suspended in a water-like liquid, the blood plasma. The most numerous type by far are red blood cells, or erythrocytes. They make up for roughly 45% of blood by volume and are responsible for the transport of oxygen from lungs to tissue. Platelets, or thrombocytes, play a key role in blood clotting, and white blood cells, or leukocytes, are cells of the immune system, responsible for defending the body against foreign material and infectious disease. In order to engage in an immune response, white blood cells have to migrate out of the blood stream into the infected tissue. This migration is a multistage process, covering different grades of cell adhesion, till the leukocyte is firmly attached to the endothelium coating the blood vessel wall and can squeeze through the wall to the tissue beyond. In the early stages of the migration process, an increased concentration of white blood cells close to the vessel wall is crucial, as adhesion needs to be induced in a sufficiently large number of leukocytes and the binding range of the adhesion molecules on the endothelium is only a few nanometre.

The adhesive dynamics between leukocytes and endothelial cells has been extensively investigated in the past, both in experiments and computer simulations. However, the segregation of blood cells necessary in the earlier stages has received little attention up to now. We here investigate the hydrodynamic interactions in the blood stream that lead to white blood cell segregation. To this end, we study the flow properties of a suspension of red and white blood cells by means of Multi-particle Collision Dynamics simulations, a mesoscopic simulation technique designed to investigate rheological properties of complex fluids.

**Date:** Monday, Nov 29, 2010 16:00

**Location:** Seminar room 138C (TU Freihaus 9. Stock, **gelb**)  
A-1040 Wien, Wiedner Hauptstraße 8-10