PHYSIK

PHYSIKALISCHES KOLLOQUIUM

UNIVERSITÄT DES SAARLANDES

Donnerstag
15.06 um 16 Uhr
Studentinnen/Studenten
sind herzlich willkommen

Alexis Darras
Experimental physics
Saarland University

"Hematological physics: flow and organization of a peculiar suspension"

Thursday, June 15th, 2023, at 4.00 p.m.
Building C6.4, Lecture Hall II

Nowadays, blood physics is a subject of intense research focus. Namely, studies on blood rheology, microfluidics, erythrocyte aggregation and membrane physics of single cells have been reported in a wide body of scientific literature. However, distribution of blood cells in the microcapillary network is still challenging to model and the physics of some blood tests commonly used in the medical literature has received only little attention. In this seminar, I'll describe my experimental research on blood cell flows and organization. These flows and organization drastically depend on the competition between the shear stress the aggregation between the blood cells. This will be highlighted by the description of two extreme situations. First, I will describe how red blood cell lingers at bifurcation, which influences the cell's downstream distribution and partly determines the oxygen delivery and solute transport to tissues (see Fig. 1 (a,b)). Second, I will discuss the physics of the erythrocyte sedimentation rate (ESR), which is a physical parameter which is often checked in medical diagnosis. This parameter is measured as the velocity of the interface between cell-free plasma and packed erythrocytes when blood is left at rest in a container (see Fig. 1(c)). In particular, I'll show that colloidal physics allows an accurate modeling of this sedimentation process. To conclude this presentation, I'll give an overview of some other interesting, but still challenging, applications of blood physics in medical testing, along preliminary results.

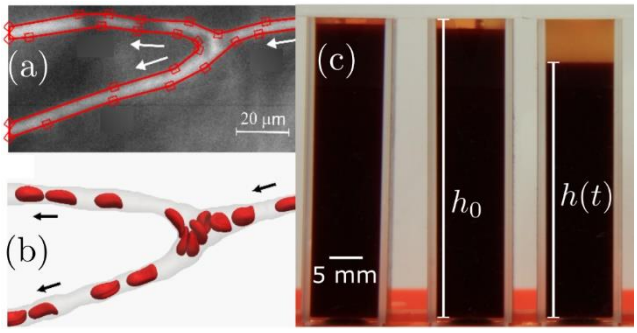

Fig. 1: (a) Bifurcation in the microcapillary network (annotated in vivo picture). The arrows indicate the direction of the flow, while the red lines highlight the border of the vessels. (b) Snapshot from a numerical simulation of the same bifurcation. (c) Illustration of the sedimentation of erythrocytes.

Prof. Wagner takes care of the speaker.
You can participate online via TEAMS:
https://tinyurl.com/4y5bea4c

Interested people are cordially invited.

Coffee and cookies are served at 4.00 p.m. in front of the Lecture Hall

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