



Der Vorsitzende des Promotionsausschusses

EINLADUNG

Hiermit lade ich ein zum öffentlichen Promotionskolloquium von

Herrn Dipl.-Ing. Mohammed Bendaoud

Experimentalphysik
(Prof. Dr. Christian Wagner)

am

Mittwoch, 5. November 2025, 12:00 Uhr s.t.

per Videokonferenz: Link für MS Teams: <https://kurzlinks.de/7spu>

Raum für die Prüfung: Raum E.11, Campus E 2.6

Thema der Dissertation:

Effect of Red Blood Cell Morphology and Suspension Heterogeneity on Microcirculation Dynamics

Red blood cell (RBC) morphology and microcirculatory behavior play a central role in blood disorders. Abnormal shapes, such as spherocytes and elliptocytes, reduce deformability and impair passage through narrow capillaries, leading to ischemia and organ dysfunction. Using Lattice-Boltzmann simulations, we show how shape changes—from healthy biconcave cells to spherocytes—affect flow rate, cell-free layer dynamics, and hydrodynamic diffusion. Results reveal non-monotonic dependencies on asphericity, with optimal shapes varying by channel width. We also find that even a small fraction (10–20%) of spherocytes can halve RBC flux and double viscosity, while other shapes have milder effects. Finally, we highlight the “memory” of RBCs, whereby prior mechanical interactions govern subsequent behavior, especially at bifurcations where lingering and partitioning occur.

Saarbrücken, 22. Oktober 2025

Prof. Dr.-Ing. Georg Frey