Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

3 D Classification of Red Blood Cells in microchannels CHRISTIAN WAGNER, Saarland University — Red blood cells (RBCs) are very soft objects that can pass capillaries smaller than the cell's diameter. Due to their high deformability, they couple strongly with the flow and can adopt many different shapes. For their quantitative characterization we developed a new confocal 3D imaging technique for fluorescent stained RBCs. We found two equilibrium cell shapes under certain flow condition: the so called 'slipper' and the 'croissant' shape. Numerical simulations are in good agreement with experimental observations. In addition, high throughput data of classical 2-D microscopy combined with an adaptive neural network allow us to obtain the full phase diagram of red blood cell shapes as a function of the flow rate. In larger channels, we use the confocal technique to characterize the margination of single rigidified RBCs in a suspension of healthy RBCs. Margination of e.g. white blood cells or platelets at the vessel walls is a haemodynamic key mechanism of our immune system. Our confocal observation technique allows us to characterize the distribution of hard vs. soft cells in full time and space resolution for the first time. Again numerical simulations are in good agreement although some quantitative differences remain that need further investigations.

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Date submitted: 27 Jun 2019 Electronic form version 1.4