Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

The use of micro-/milli- fluidics to better understand the mechanisms behind deep venous thrombosis[1] ZOE SCHOFIELD, ALESSIO ALEXIADIS, ALEXANDER BRILL, GERARD NASH, DANIELE VIGOLO, University of Birmingham — Deep venous thrombosis (DVT) is a dangerous and painful condition in which blood clots form in deep veins (e.g., femoral vein). If these clots become unstable and detach from the thrombus they can be delivered to the lungs resulting in a life threatening complication called pulmonary embolism (PE). Mechanisms of clot development in veins remain unclear but researchers suspect that the specific flow patterns in veins, especially around the valve flaps, play a fundamental role.Here we show how it is now possible to mimic the current murine model by developing micro-/milli-fluidic experiments. We exploited a novel detection technique, ghost particle velocimetry (GPV), to analyse the velocity profiles for various geometries. These vary from regular microfluidics with a rectangular cross section with a range of geometries (mimicking the presence of side and back branches in veins, closed side branch and flexible valves) to a more accurate venous representation with a 3D cylindrical geometry obtained by 3D printing. In addition to the GPV experiments, we analysed the flow field developing in these geometries by using computational fluid dynamic simulations to develop a better understanding of the mechanisms behind DVT.

[1]ZS gratefully acknowledges financial support from the EPSRC through a studentship from the Sci-Phy-4-Health Centre for Doctoral Training (EP/L016346/1).

Zoe Schofield
University of Birmingham

Date submitted: 26 Jul 2016 Electronic form version 1.4