Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Volumetric PIV in Patient-Specific Cerebral Aneurysm MELISSA BRINDISE, Purdue Univ, BEN DICKERHOFF, Marquette University, DAVID SALONER, University of California San Francisco, VITALIY RAYZ, University of Wisconsin - Milwaukee, PAVLOS VLACHOS, Purdue Univ — Cerebral aneurysms impose a unique challenge in which neurosurgeons must assess and decide between the risk of rupture and risk of treatment for each patient. Risk of rupture is often difficult to determine and most commonly assessed using geometric data including the size and shape of the aneurysm and parent vessel. Hemodynamics is thought to play a major role in the growth and rupture of a cerebral aneurysm, but its specific influence is largely unknown due to the inability of *in vivo* modalities to characterize detailed flow fields and limited *in vitro* studies. In this work, we use a patient-specific basilar tip aneurysm model and volumetric particle image velocimetry (PIV). *In vivo*, 4-D PC-MRI measurements were obtained for this aneurysm and the extracted pulsatile waveform was used for the *in vitro* study. Clinically relevant metrics including wall shear stress (WSS), oscillatory shear index (OSI), relative residence time (RRT), 3-D pressure contours, and pressure wave speed were subsequently computed. This is the first study to investigate *in vitro* 3-D pressure fields within a cerebral aneurysm. The results of this study demonstrate how these metrics influence the biomechanics of the aneurysm and ultimately their affect on the risk of rupture.

Melissa Brindise
Purdue Univ

Date submitted: 01 Aug 2016 Electronic form version 1.4