

# UNB Physics Department Seminar

## Measurement of the velocity of fast flows inside small structures with Tagged MRI

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Velocity is one of the most important parameters to study in complex fluid flow systems. Information about velocity distributions enhances our understanding about fundamental knowledge of complex fluid phenomena. There is a wide range of velocimetry measurements in many types of flows. MRI is a non-invasive tool for quantitative visualisation of fast fluid flows. Due to the benefits that MRI offers (no need for any physical contact with the flowing fluid, no transparency limitations to make a measurement) it has been a topic of extensive studies. Many of the flow studies by MRI have been made to measure the velocity of a fluid media by using either phase encoding or time of flight (TOF) measurements. Until now, motion sensitised SPRITE is the best method for the velocity assessment of very fast flows when the structure is large enough compared to flow displacement during the encoding time  $t_p$ . However, when displacement during the encoding time becomes greater than pixel size, a velocity misregistration takes place. To detect the velocity with more accuracy we need to reduce the encoding time. There is a restriction on the encoding time reduction in motion sensitised SPRITE: both the velocity encoding, and spatial encoding times are happening simultaneously, causing longer encoding time. If these two steps are separated it is possible to reduce the encoding time. This aim is accessible by applying TOF method. In this approach the fluid is labeled by a spatially periodic modulation of the magnetization. Since the modulation part can be performed when the liquid is still moving slowly, and the imaging part does not require the bipolar gradient switching on and off, it is in principle possible to considerably reduce the characteristic measurement part and detect the fast flow with a greater accuracy. In this talk I will present and discuss result of these methods.

Thursday Sept. 19, 2019, 1:15--2:15 pm in  
P204. Colloquium tea in P203 beforehand