Australian Society of Rheology

The ASR Seminars

DATE: Wednesday, 12th November, 2014

TIME: 5:30-6:00 pm: Refreshments (nibbles and drink)

6:00-7:00 pm: Presentations

VENUE: **MONASH UNIVERSITY, CLAYTON CAMPUS**
4th Floor, New-Horizons Building
Venue and parking areas are indicated in the map next page.

SPEAKERS:

1. Dr. Tapio Simula
School of Physics, Monash University

Title: Quantum Turbulence

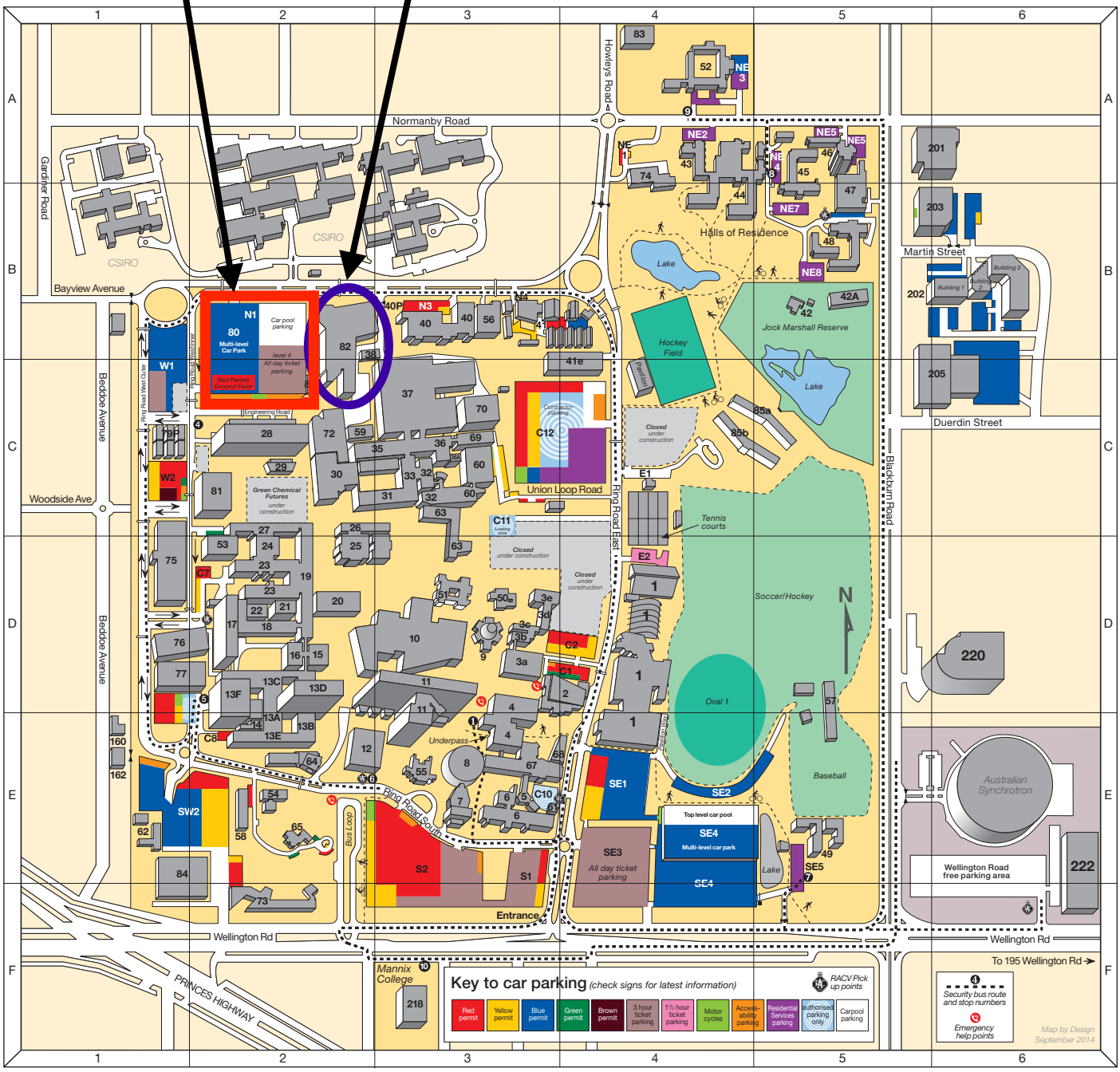
2. Dr. Russell Varley
Research Team Leader, CSIRO Manufacturing

Title: Making Composites that Last Longer, Perform Better and are More Sustainable: It's always about the Rheology!

For enquiries, please contact Dr. Prabhakar Ranganathan on (03) 9053480 or prabhakar.ranganathan@monash.edu

Multi-level car park

New Horizons Building
Bldg. no. 82



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Quantum Turbulence

Dr. Tapio Simula
School of Physics
Monash University

Superfluids are fluids which have the ability to support persistent currents and frictionless flows. Rotation in superfluids is possible through nucleation of vortices whose circulation is quantized. Turbulence in such fluids is coined quantum turbulence and corresponds to chaotic, topologically protected, dynamics of these whirlpools of the quantum world.

This presentation begins with an introduction to basic concepts of superfluidity and quantized vorticity. A brief outline of key concepts of turbulence, highlighting the differences and similarities between classical fluids and superfluids, are then presented. This is followed by a more detailed discussion of recent theoretical and experimental results in the emerging field of two-dimensional quantum turbulence. Questions are welcomed throughout the talk.

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Making Composites that Last Longer, Perform Better and are More Sustainable: It's always about the Rheology!

Dr Russell Varley
Research Team Leader
CSIRO Manufacturing

The excellent strength to weight ratio and corrosion resistance of polymer composites makes them very attractive to industries that are developing more sustainable manufacturing processes and products. It is their reduced weight in particular however, that is driving wider usage in the aerospace, automotive and Oil and Gas industries, such that the new Boeing 787 and Airbus 350 now consist of about 50% polymer composite. While the promise of reduced weight underpins these applications, it is actually the developments in polymer processing and new processable resins systems that have enabled composites to take full advantage, through improved product quality, reliability and control. Clearly, understanding the interplay between the chemical and visco-elastic changes which occur during processing is critical to final properties and performance. As you would expect, it's all about the rheology!

This presentation therefore, will introduce some important rheological and visco-elastic concepts, such as gelation, resin infusion, vitrification, crystallisation and glass transition temperature in the context of processing high performance polymer composites, both thermoplastic and thermosetting. Using examples from different areas of our polymer composite research, the importance of understanding and controlling rheological behaviour during processing and its impact upon properties and function will be discussed. This will include a brief introduction into novel high performance self-healing polymer composites, the challenges of ring opening polymerisation of thermoplastic polymers and the quest for the next generation high performance epoxy composites.

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