

# IQSE AMO QO Seminar Series

Tuesday, May 30th, 11:30 am ZOOM & IQSE  
seminar room (MPHY 578)

Pizza will be served for IQSE members at 11:00 am. The talk will start around 11:30 am

## Dr. Vanderlei S. Bagnato

(University of São Paulo, Brazil; Texas A&M University)

### Characterization and Universal Scaling Properties of a Turbulent Atomic Superfluid

**ABOUT THE SPEAKER:** Vanderlei S. Bagnato is a professor at the BME and Physics and Astronomy Department at Texas A&M University, as well as at the Department of Physics and Materials Science at Brazil's University of São Paulo and the Institute of Physics of São Carlos. Prof. Bagnato is a world-known expert in laser cooling, trapping neutral atoms, and applying the principles of optics and lasers in health sciences. Prof. Bagnato is a member of the National Academy of Sciences, the Pontifical Academy of Sciences of the Vatican, the World Academy of Sciences, and the Brazilian Academy of Science, as well as being a Commander of Brazil's National Order of Scientific Merit.

**EVENT DETAILS:** Excitation of the trapped BEC can be done through a combination of fields that promote time distortion of the trapping potential. These excitations can evolve over time, promoting energy migration from the largest to the smallest scales in a process called cascade. We perform temporal excitations that consist of deformation and slight rotation of the potential, causing the system to evolve into a turbulent regime. Simulations demonstrated the generation of solitons, vortices, and waves in the sample. Using time of flight techniques, we measure the moment distribution,  $n(k, t)$  and from it we obtain the energy spectrum  $E(k, t)$ . This makes it possible to identify the inertial regions, where  $E(k, t)$  is clearly dependent on the power law (inertial region) characteristic of the turbulent regime, and to measure the energy flow migrating between the scales and their preservation from the absence of dissipation. Finally, the temporal evolution of the moment distribution allows us to verify the presence of space-time scalability, which indicates the presence of a class of universality in the phenomenon. The problem is investigated on the basis of the theory of the existence of non-thermal fixed points in the system and a discussion of these aspects is offered.

#### **ZOOM information:**

<https://tamu.zoom.us/j/98156251523?pwd=QVdSdGxtL1UyY0g1L083SU5QR0QrUT09>

Meeting ID: 981 5625 1523

Passcode: 297578

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