

S E M I N A R



Prof Michael Tsamparlis
(University of Athens and University
of KwaZulu-Natal)

Date:

Thursday, 12 March 2026

Time:

12h15-13h15 SAST

Venues:

- **NITheCS Seminar Room**
University of KwaZulu-Natal
Westville Campus
3rd Floor, H-Block,
School of Chemistry and Physics
- **Online**

WHO SHOULD ATTEND?

The seminar should be accessible to advanced undergraduates, postgraduates and researchers in General Relativity.

ENQUIRIES:

Email Dr Cerene Rathilal:
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Symmetries and the algorithm for constructing gravitational models in General Relativity

ABSTRACT

We present a precise, step-by-step algorithm for constructing and interpreting gravitational models within General Relativity. The logical structure of the theory is made explicit by separating three distinct elements:

- Geometric assumptions (symmetries) that define a specific metric g_{ab} ,
- Einstein field equations, which lock this geometry to the total energy-momentum tensor T_{ab} , and
- An independent and necessary choice of a family of observer u^a .

The 1+3 decomposition of $u_{a;b}$ and T_{ab} then defines the kinematic quantities (expansion, shear, vorticity, acceleration) and the observed physical quantities (energy density, pressure, heat flux, anisotropic stress) for that specific observers.

The choice of an observer is not a search for an absolute truth, but a necessary “selection rule”. The validity of a model lies not in its absolute truth, but in the coherence of the selections used to build it.

Demonstration examples will be presented and discussed.

Prof Michael Tsamparlis is Emeritus Professor in the Faculty of Physics at the University of Athens, Greece, and Honorary Professor in the School of Chemistry and Physics at the University of KwaZulu-Natal.



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