Lectures on Magnetar

Tuesday, 15 September 2015 - Wednesday, 16 September 2015

LNGS

Programme

THERE IS NO CONFERENCE FEE

15 September, Tuesday

Morning, Pontecorvo Room

9:30-10:30 - R. Turolla - Soft gamma-repeaters and Anomalous X-ray pulsars (SGRs & AXPs): the observational manifestations of magnetars

10:30-11:30 - A. Bonanno - Introduction to dynamo theory

11:30-12:00 - Break

12:00-13:00 - R. Turolla - Persistent emission from magnetar sources

Afternoon, Rossi Room

14:30-16:30 - Round table discussion

16 September, Wednesday

Morning, Pontecorvo Room

9:30-10:30 - A. Bonanno - Stability of magnetic fields in stably stratified stellar interior

10:30-11:30 - R. Turolla - Transient magnetars, bursts & giant flares

11:30-12:00 - Break

12:00-13:00 - A. Bonanno - The generation of MF in NS

Afternoon, Pontecorvo Room

14:30-16:30 - Round table discussion

List of abstracts

Roberto Turolla

(Padova University & INFN)

Lecture 1 - Soft gamma-repeaters and Anomalous X-ray pulsars (SGRs & AXPs): the observational manifestations of magnetars

The observational properties of "magnetar sources" are reviewed. This will cover both the persistent emission at different wavelenghts and bursts & flares from SGRs and AXPs. Observational evidences in favor of the magnetar scenario are discussed.

Lecture 2 - Persistent emission from magnetar sources

The current picture for the persistent X-ray emission of magnetars is presented. Starting from the "twisted magnetosphere" model it is shown how the observed X-ray spectrum can be reproduced and how the comparison of models with data can probe the structure of the star magnetosphere.

Lecture 3 - Transient magnetars, bursts & giant flares

Emission from magnetars is variable on different timescales, from less than a second for the bursts, to several months for the outbursts which characterize transient sources. The current modeling and the physical mechanisms responsible for these phaenomena are reviewed.

Alfio Bonanno

(INAF & INFN)

Lecture 1 - Introduction to dynamo theory

Mean field MHD and the alpha-effect. Models of dynamo mechanisms: alpha-omega and alpha^2

dynamo. Exact solutions and numerical solutions.

Lecture 2 - Stability of magnetic fields in stably stratified stellar interior

Basic MHD instabilities. Tayler instability. MRI instability. Numerical simulations and experiments.

Lecture 3 - The generation of MF in NS

Basic of proto-NS physics. Dynamo actions in proto-NS. Cooling of isolated NS: the role of magnetic fields and superfluidity.