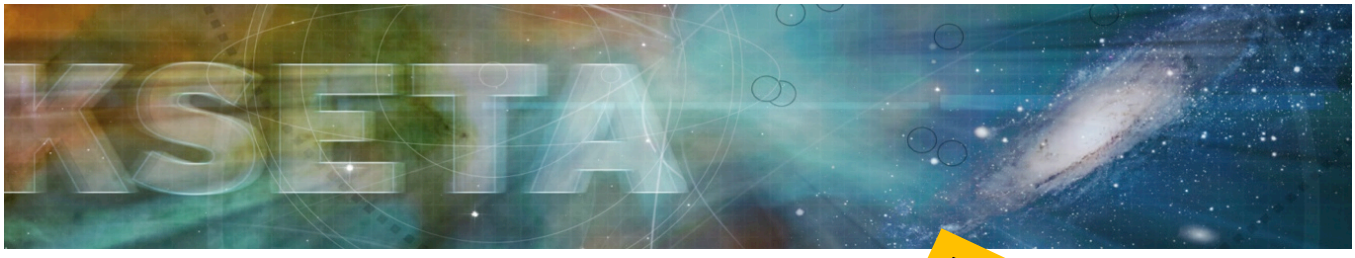

Registration until September 20

KSETA course

Prof. Gustavo E. Romero

(CONICET/UNLP/UNSAM, Buenos Aires, Argentina, KSETA guest scientist)

October 9 – 13, 2017

Monday – Friday 11:00 – 12:30 h (not Wednesday)

KIT Campus North, building 425, room 206

Particle acceleration in astrophysics

The course addresses the problem of how particles can be naturally accelerated up to very high energies in the universe. Fermi acceleration processes are presented in relation to astrophysical sources, with emphasis on diffusive shock acceleration. Acceleration by magnetic reconnection is also introduced as a viable mechanism relevant in magnetically dominated sources. The radiative losses of different types of particles during acceleration and propagation are reviewed for several scenarios, both galactic and extragalactic. From all this, some implications for the origin of cosmic rays at different energies are drawn up.

1. Introduction. The non-thermal universe.

2. Types of acceleration mechanisms. Direct electromagnetic acceleration. Gravitational acceleration. Fermi mechanism.

3. Diffusive shock acceleration. Theory and examples.

4. Magnetic reconnection. Theory and examples.

5. Radiative losses. Synchrotron radiation. Inverse Compton scattering. Relativistic Bremsstrahlung. Hadronic losses.

6. Astrophysical examples. Galactic sources. Extragalactic sources.

This lecture is part of the Double Doctoral Degree in Astrophysics between UNSAM and KIT.

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