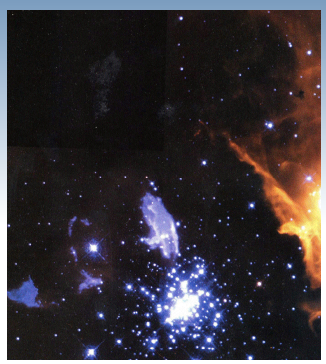
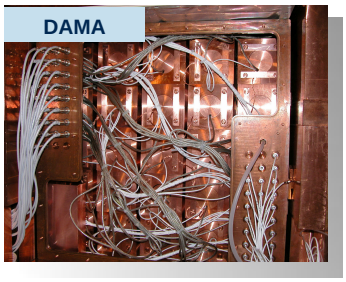
Dark matter, rare events and more ...

Astronomical observations show that most of the matter in the universe (about 90%)is dark, i.e. cannot be detected because it doesn't emit the light. The presence of "dark matter" is inferred indirectly from the motions of astronomical objects, specifically stellar, galactic, and galaxy cluster observations. It is also required in order to explain the large-scale structures that can be seen in the universe today.
One of the most reliable candidates for dark matter is the so-called WIMP (Weakly Interacting Massive Particle) which is studied to understand the features of our Cosmos.

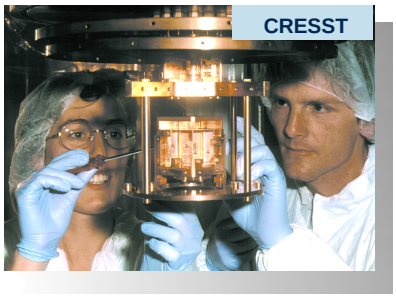


DAMA

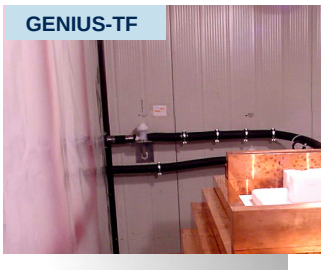


Dark matter experiments.
The DAMA experiment employs NaI crystals to detect WIMPs by means of the flash of light produced in the detector by an Iodine nucleus after having been hit by a WIMP, a very rare phenomenon. To distinguish these events from background, DAMA searches for an annual modulation of the rate. DAMA is presently the only dark matter detector in the world sensitive to seasonal modulation of WIMPs. Another interesting experiment is CRESST. It makes use of a cryogenic technique, looking for a very tiny temperature increase in the detector, produced by the energy deposited by nuclei hit by the WIMPs.

CRESST



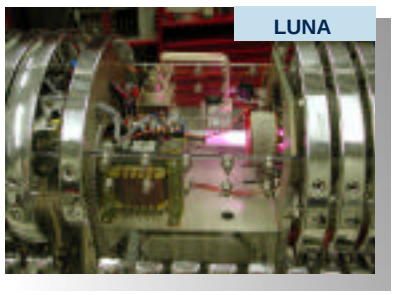
GENIUS-TF



CUORICINO

Double beta decay experiments. According to the hypotheses suggested by the Italian scientist Majorana, neutrinos might coincide with antineutrinos of the same flavor. If one can verify such hypothesis, the mass of neutrino will be measured with a certain precision. Heidelberg-Moscow ββ (11 kg enriched Germanium detector) is the world leader in this field and it reached the bes limit in the world of Majorana neutrino mass.
An upgrade of this experiment is Genius-TF, a test for a new generation double beta decay experiment. Cuoricino uses a different technology with a sensitive mass of 40 kg of Tellurium in a cryogenic setup.

LUNA



Nuclear Astrophysics.
The LUNA experiment studies the nuclear reactions relevant for the energy production in the stars.
LUNA, after having studied most of the reactions of pp-chain down to the energy of the nucleosynthesis in the stars, now is studying the first step of the CNO cycle.
The experiment uses a 400 KeV accelerator of proton beams.