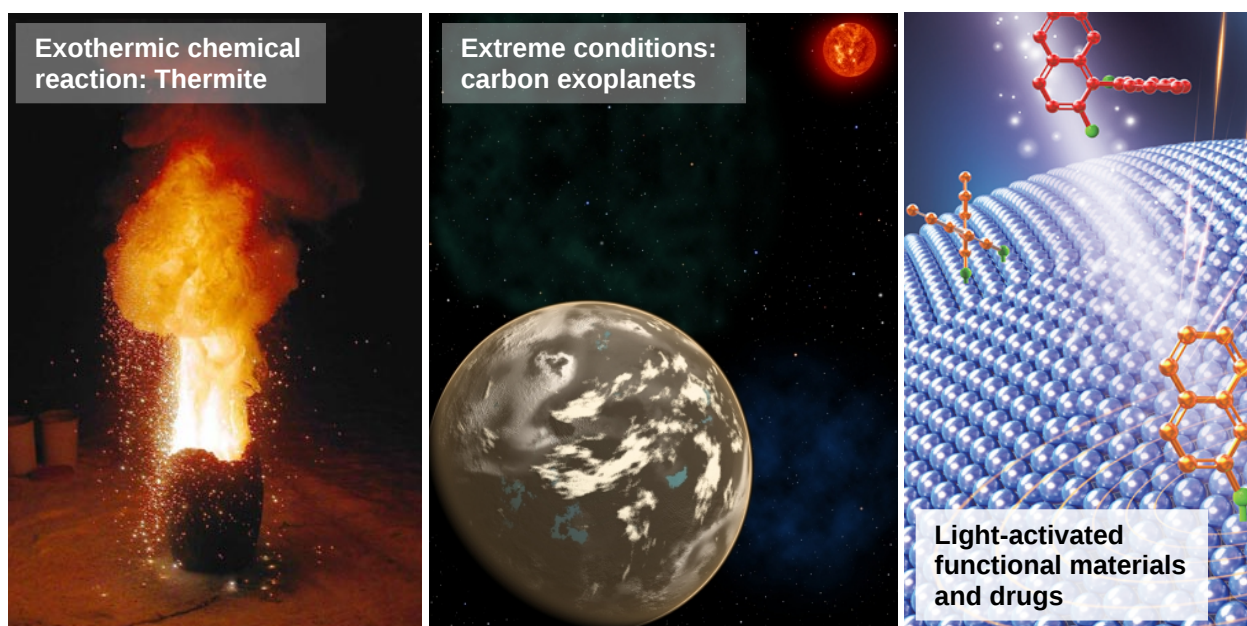


## Ultrashort light pulses for exploring unknown properties of matter

Our knowledge of matter and its properties is still limited. The major part of the matter found in the universe exists under conditions of temperature and pressure not compatible with our planet. Moreover, many properties of materials are associated with processes occurring in a few tens of femtoseconds, often too fast to be analyzed and properly understood.

Very recent and impressive technological advance in generation of sub-ps light pulse in a broad spectral domain, including the visible and the X-ray ranges, offers the opportunity to investigate unknown properties of materials getting access to the atomic environment and sub-picosecond time scale.

The beamline EIS-TIMEX, at the FERMI free electron laser (FEL) in Trieste (<http://www.elettra.eu/lightsources/fermi/fermi-machine/fermi-description.html>), is designed for this frontier research using FEL and fs-laser techniques. The research staff continuously explores new methods for progressing in the field.



Main scientific cases at EIS-TIMEX include:

- 1) atomic scale picosecond chemical reactions
- 2) matter under extreme thermodynamic conditions (exoplanets, stars, dense plasma)
- 3) light-activated functional materials
- 4) atomic interaction of drug molecules with model cellular membranes

PhD students will work in a unique international research facility. They will be fully involved in the beamline activity, learning how to operate many classes of time-resolved measurements and how to prepare the experimental setups. They will participate in the beamline experiments, analyze experimental data and finally take part in scientific articles publication.

Do not hesitate to contact the EIS-TIMEX coordinator, Emiliano Principi, for visiting the beamline and further details.

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