ABSTRACT
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The considerable effort to demonstrate the scientific viability of laser fusion, currently underway at NIF, LMJ, will by no means constitute the first goal of the road towards inertial fusion energy. An equivalent effort will be needed to develop appropriate technologies capable of operating under the adverse conditions expected in future inertial (laser) fusion power plants. The development of such technologies is in general out of the catalogues and requires intensive research to find out adequate solutions to very complicated problems. In other words, the advent of laser fusion energy will only be possible if technological viability is demonstrated and this requires intensive efforts in a broad range of fields: Physics, Engineering, Materials Science, manufacturing techniques, safety studies, hydrodynamics...

A body of knowledge has been developed on target design and fabrication and will be used for the necessary future developments towards high gain targets. With respect to reactor technologies the situation is very complementary to that in magnetic fusion thought with key peculiarities. Many laser (inertial) fusion projects have worked on reactor solutions, being HAPL, LIFE and HiPER projects the most advanced ones. On the other hand, the magnetic fusion community has mainly focused its efforts in the development of materials to resist the irradiation threats. Potentially, most of these efforts can be exploited for laser fusion reactors.

In these lectures, the state-of-the-art situation both in target and reactor technologies will be presented. Aspects such as target fabrication, materials choice, irradiation conditions, reactor solutions, safety, shields, tritium cycle, waste and blanket issues will be discussed.

Lectures descriptors

1. **Introduction and Radiation Fluxes**
   1.1. Reaction chamber components
   1.2. Target factory
   1.3. Fusion plasmas
   1.4. Neutrons and gammas
   1.5. Ions and x-rays
   1.6. Laser fusion vs. Magnetic fusion
   1.7. Direct drive targets vs. Indirect drive targets

2. **Radiation-matter interaction: Thermo-mechanical effects**
   2.1. First wall with direct drive target vs. Magnetic divertor
   2.2. Final optics
   2.3. Blanket: heat extraction

2.4. High flux x-ray pulses with indirect drive targets

3. Radiation-Matter interaction: Atomistic effects

3.1. Ion irradiation
3.2. Neutron irradiation: defects and activation
3.3. Electron and gamma irradiation
3.4. Defect production mechanisms and magnitudes
3.5. Effects on macroscopic properties
3.6. First wall with direct drive targets
3.7. Neutron-irradiated final optics
3.8. Neutron effects on structural materials

4. Reactor technology: a few considerations on Systems

4.1. Chamber protection components
4.2. New materials
4.3. Cooling
4.4. Tritium cycle
4.5. Safety, shielding
4.6. Accidents