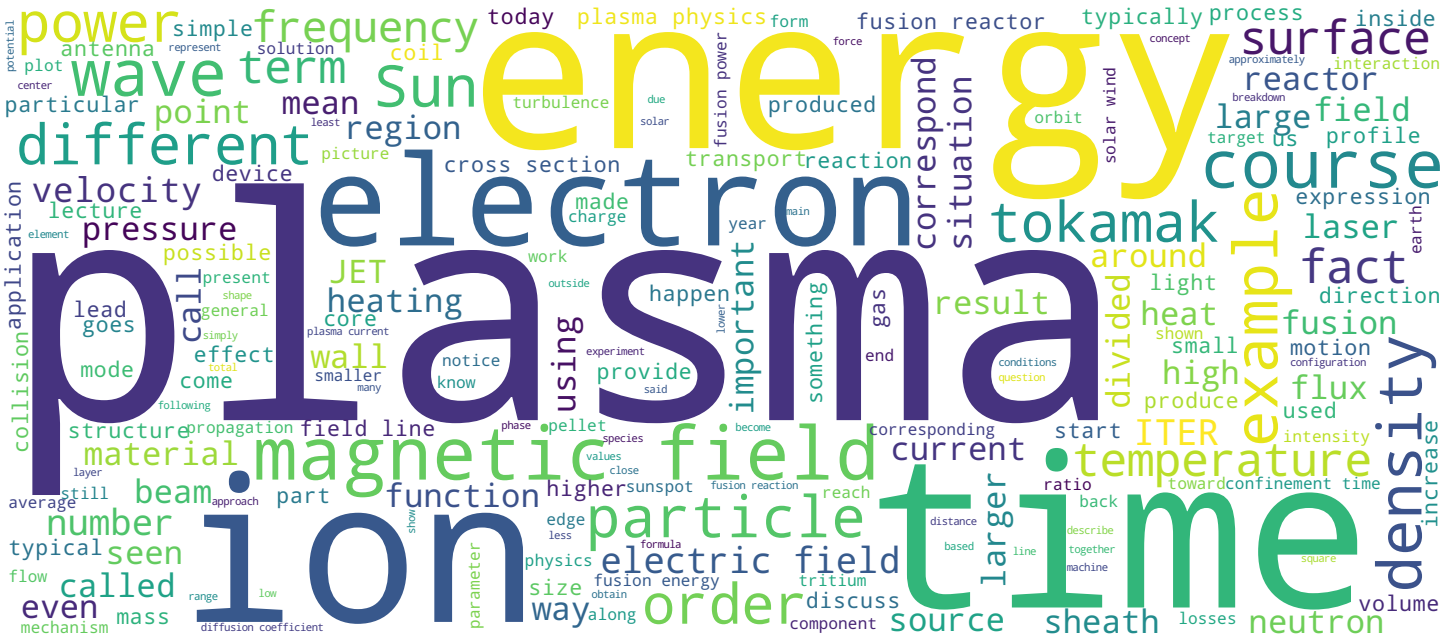

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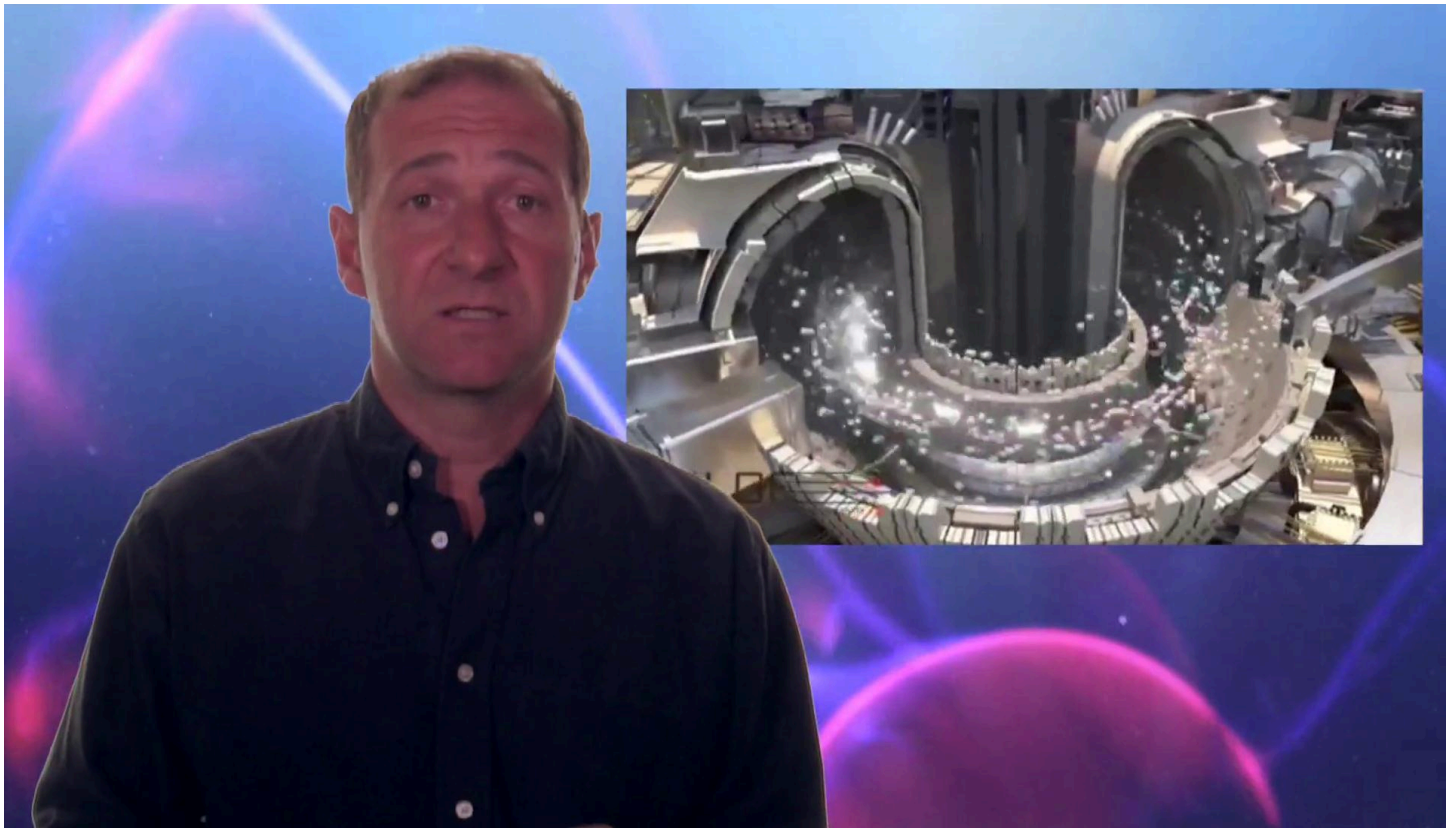

This lecture starts the third part of the course in which we will discuss one of the main applications of plasma physics: fusion energy. Fusion energy is a possible solution of one of the most formidable challenges faced by mankind today, that of finding a source of energy that is safe, abundant, available to all, and compatible with sustainable development. This lecture, which I have the pleasure to teach myself, provides a general introduction to fusion, starting from the basic reactions and processes, and continuing with the calculation of the power balance in reactors. We will then discuss the two possible approaches to trap plasmas in the reactor and obtain fusion energy on earth: magnetic and inertia confinement. Focusing on a magnetic confinement approach, we will then design the main elements of a reactor, taking into account both physics and engineered constraints. We will finally discuss two of the main challenges for fusion reactors, at the interface between plasma physics and material science, that of the interaction between the plasma and its surrounding walls. A very difficult question, as you can imagine, as matter that is much hotter than that of the surface of the sun is only a few centimeters away from material surfaces. And that of the structural materials, for present and future fusion reactors.

Notes

Summary

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