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Composite Processes in Fusion Burning Plasmas and Gained Innovative Perspectives[1] B. COPPI, MIT, A. CARDINALI, ENEA, Italy, B. BASU, MIT — A new kind of tridimensional structures (ballooning in both the radial and poloidal directions) has been identified that can be maintained spontaneously in fusion burning plasmas and transfer energy from the emitted reaction products to the reacting nuclei populations. The involved resonant mode-particle interactions [1] are shown to affect the initial mode spatial profile. Minimal electron temperatures of the order of the ideal ignition temperature for DT (Deuterium-Tritium) plasmas are required in order to avoid transferring energy at significant rates to the electron population by mode-particle interactions. The observed D-D (Deuterium-Deuterium) fusion reaction rates [2] resulting from energetic neutral H-beam injection into D-plasmas are consistent with the directions emerging from the presented theory and warrant the investigation of more sophisticated and less severe ignition conditions ("cool fusion") than those commonly considered for burning plasmas. [1] B. Coppi, Pl. Phys. Rep. **45**, 438 (2019). [2] R. M. Magee *et al.*, Nature **15**, 281 (2019).

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