

Polywell Fusion - Electrostatic Fusion in a Magnetic Cusp Bottle

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Nuclear fusion power is considered the ultimate energy source because of its nearly inexhaustible supply of cheap fuels, intrinsic safety, zero emissions and lack of long-lived radioactive waste. Despite tremendous progress in science and technology of fusion reactors, the general consensus has been, and still is, "fusion is always 20 years away". In this talk, I will introduce the Polywell fusion concept that may offer a low cost and rapid development path to power the world economically and sustainably.

As conceived by Dr. Robert Bussard at EMC2 in 1985, the Polywell fusion concept combines electric fusion with magnetic cusp confinement. This allows the Polywell reactor to be small, stable, and highly efficient. The successful development of Polywell reactor hinged on validating magnetic cusp confinement. Since 1994, EMC2 had built and operated successive test devices from Wiffle-Ball-1 (WB-1) to WB-8. Finally, EMC2 carried out an experiment that demonstrated dramatically improved high-energy electron confinement in a magnetic cusp system in late 2013. A committee of fusion science experts independently reviewed this work and stated that it was "a major achievement and a prerequisite to concept success". I will present a roadmap to complete the proof-of-principle test toward a net power producing Polywell fusion reactor for electricity generation.

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