Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Application of Fusion Gyrotrons to Enhanced Geothermal Systems (EGS)[1] P. WOSKOV, H. EINSTEIN, MIT, K. OGLESBY, Impact Technologies — The potential size of geothermal energy resources is second only to fusion energy [1]. Advances are needed in drilling technology and heat reservoir formation to realize this potential. Millimeter-wave (MMW) gyrotrons and related technologies developed for fusion energy research could contribute to enabling EGS. Directed MMW energy can be used to advance rock penetration capabilities, borehole casing, and fracking. MMWs are ideally suited because they can penetrate through small particulate extraction plumes, can be efficiently guided long distances in borehole dimensions, and continuous megawatt sources are commercially available. Laboratory experiments with a 10 kW, 28 GHz CPI gyrotron have shown that granite rock can be fractured and melted with power intensities of about 1 kW/cm^2 and minute exposure times. Observed melted rock MMW emissivity and estimated thermodynamics suggest that penetrating hot, hard crystalline rock formations may be economic with fusion research developed MMW sources.

[1] H. Armstead and J. Tester, *Heat Mining*, E. & F.N. Spon, (1987).

[1]Supported by USDOE, Office of Energy Efficiency and Renewable Energy and Impact Technologies, LLC.

P. Woskov
MIT

Date submitted: 11 Jul 2013 Electronic form version 1.4