Abstract Submitted
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Design and Implementation of a 200kW, 28GHz gyrotron system for the Compact Toroidal Hybrid Experiment[1] G.J. HARTWELL, S.F KNOWLTON, D.A ENNIS, D.A. MAURER, Auburn University, T. BIGELOW, Oak Ridge National Laboratory — The Compact Toroidal Hybrid (CTH) is an $\ell = 2, m = 5$ torsatron/tokamak hybrid ($R_0 = 0.75\,\mathrm{m}$, $a_p \sim 0.2\,\mathrm{m}$, and $|B| \leq 0.7\,\mathrm{T}$). It can generate its highly configurable confining magnetic fields solely with external coils, but typically operates with up to 80 kA of ohmically-generated plasma current for heating. New studies of edge plasma transport in stellarator geometries will benefit from CTH operating as a pure torsatron with a high temperature edge plasma. Accordingly, a 28 GHz, 200 kW gyrotron operating at 2nd harmonic for ECRH is being installed to supplement the existing 15 kW klystron system operating at the fundamental frequency; the latter will be used to initially generate the plasma. Ray-tracing calculations that guide the selection of launching position, antenna focal length, and beam-steering characteristics of the ECRH have been performed with the TRAVIS code[1]. The calculated absorption is up to 95.7% for vertically propagating rays, however, the absorption is more sensitive to magnetic field variations than for a side launch where the field gradient is tokamak-like. The design of the waveguide path and components for the top-launch scenario will be presented.
[1]N.B. Marushchenko, Y. Turkin, H. Maassberg, Comp. Phys. Comm. 185 165 (2014)

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