

Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Effect of multiple electron cyclotron harmonics on current drive in QUEST spherical tokamak¹ TAKUMI ONCHI, HIROSHI IDEI, MASAHARU FUKUYAMA, MAKOTO HASEGAWA, KENGOH KURODA, RYUYA IKEZOE, KAZUAKI HANADA, Kyushu University, AKIRA EJIRI, The University of Tokyo, TSUYOSHI KARIYA, University of Tsukuba, ATSUSHI FUKUYAMA, Kyoto University, MASAYUKI ONO, PPPL, QUEST TEAM — Multiple harmonic resonances, from second to fourth for 28 GHz radio frequency (RF), of electron cyclotron wave coexist in QUEST spherical tokamak, and their heating is effective especially for energetic electrons with oblique injection of RF beam. Under the resonance condition with parallel refractive index $N_{\parallel} > 0.75$ and energetic electron temperature $T_e > 50$ keV in the geometry of QUEST device, the effect of relativistic shift is significantly large. The higher harmonic down-shifted resonance overlaps with the lower harmonic up-shifted resonance owing to Doppler-shift effect. The lower harmonic heating is stronger than higher harmonic heating, and hence the efficient current drive is expected of the multiple harmonic up-shifted resonance with oblique RF injection from the low field side. Such multiple harmonic heating may be a mechanism of the current drive of $I_p > 80$ kA solely by obliquely injected X-mode beam, where $N_{\parallel} = 0.75$ and RF power is 120 kW.

¹This

work is supported by NIFS Collaboration Research program (NIFS19KUTR136, NIFS17KUTR128)

Takumi Onchi
Kyushu University

Date submitted: 03 Jul 2019

Electronic form version 1.4