Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Experimental observation of frequency up-conversion by flash ionization phenomena NOBORU YUGAMI, TAKAMITSU OTSUKA, Utsunomiya University, YASUHIKO SENTOKU, Nevada University at Reno, AKINORI NISHIDA, RYOSUKE KODAMA, Osaka University — When plasmas are instantaneously created around an electromagnetic wave, frequency of the wave up-converted to the frequency, which depends on the plasma frequency. This phenomenon is called as the flash-ionization predicted by S. C. Wilks et.al. The theory requires not only the plasma creation in time much shorter than an oscillation period of the electromagnetic wave but also plasma length much longer than a wavelength of it. We have demonstrated the proof of principle experiment using the interaction between a terahertz wave and plasmas created by an ultra short laser pulse, which ensures the plasma creation time-scale much shorter than a period of electromagnetic source wave and plasma length longer than a wavelength of the wave. We observed frequency up-conversion from 0.35 THz to 3.3 THz by the irradiance of the Ti:sapphire laser in ZnSe crystal. The increment of the terahertz wave frequency is good agreement of the theory.

Noboru Yugami
Utsunomiya University

Date submitted: 12 Jul 2013 Electronic form version 1.4