

エクストリームフォトンクスセミナー *Extreme Photonics Seminar*

No.12

Language: **English**

Date : Nov. 30th(Tue), 2010, 13:30 ~ 14:30
Location : Cooperation Center, 5F Meeting Room, W524
(研究交流棟5階会議室 W524)

Title : **History of the 50 Year Ascent 1960 – 2010**
Nonlinear Path to High-Intensity Interactions
and Giant keV X-Ray Nonlinearities

Speaker : **Prof. Charles K. Rhodes**
(University of Illinois at Chicago, USA)

The history of nonlinear high-intensity interactions, that commenced in 1961 with the observation of second harmonic radiation [1] at 347.2 nm in crystalline quartz, spans a range of $\sim 10^{18}$ in experimental intensity and the area of study remains a stable, robust province of fundamental laser-based research after a half century. As an example of this effort, over a period of ~ 25 years, a path of research was cut through this field of nonlinear phenomena that led to the development of a multikilovolt (~ 4.5 keV) x-ray amplifier of exceptional peak brightness [2] whose experimentally based power-scaling limit for a compact laboratory instrument falls in the multi-petawatt realm [3]. This presentation highlights a brief history of these nonlinear interactions and explores their extension into the keV x-ray regime.



Unbelievable / Escher
c. 1952

References

1. Franken P A, Hill A E, Peters C W and Weinreich G 1961 Generation of Optical Harmonics, *Phys. Rev. Lett.* **7** 118.
2. Borisov A B, Song X, Frigeni F, Koshman Y, Dai Y, Boyer K and Rhodes C K 2003 Ultrabright multikilovolt coherent tunable x-ray source at $\lambda \sim 2.71$ -2.93 Å *J. Phys. B: At. Mol. Opt. Phys.* **36** 3433.
3. Borisov A B, Racz E, Khan S F, Poopalasingam S, McCorkindale J, Zhao J, Boguta J, Longworth J, and Rhodes C K 2010 Power Scaling of the Xe(L) Amplifier at $\lambda \sim 2.8$ Å into the Petawatt Regime, *J. Phys. B: At. Mol. Opt. Phys.* **43** 015402.