Development a Compact X-Ray Laser Amplifier at 4.0 nm

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The so-called "water-window" x-ray microscopy is a holy grail of modern molecular biology. A pulsed source of coherent x-rays within this "spectral window", falling between 2.3 nm and 4.4 nm, provides a unique tool for time-resolved imaging of bio-systems in their natural environment. At these wavelengths water is semi-transparent while proteins are mostly opaque, resulting in high-contrast **measurement on the sub-cellular level.**

We propose to present, for the first time, generation a very high gain of G≈ 60 1/cm in a table-top device in He-like CV ions in transitions to ground states at 4.03 nm.

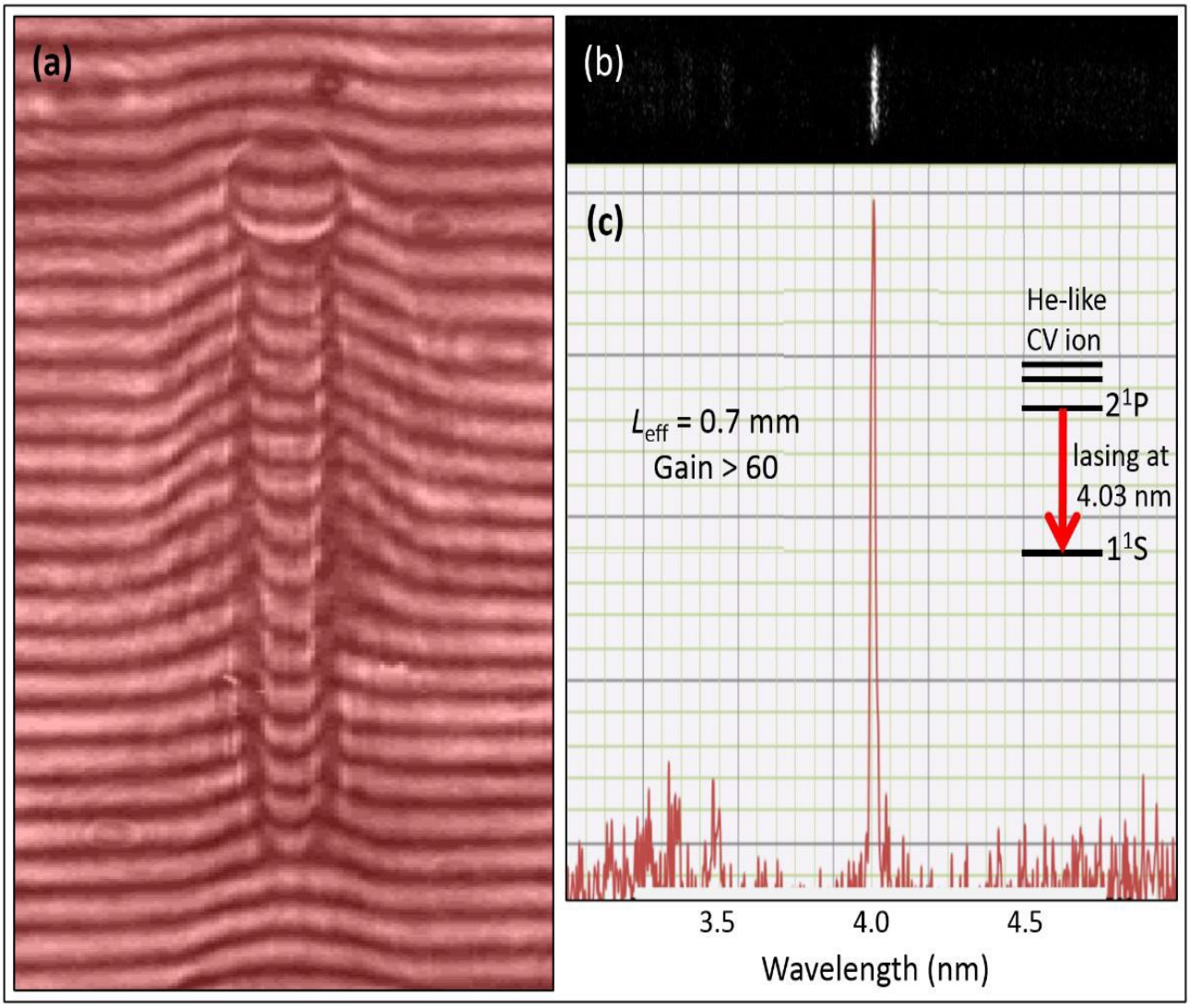

Fig.1.: Example of x-ray laser (XRL) high gain **G ≥ 60/cm** in "water window" at 4.03 nm; **(a)** Laser interferogram showing a phase profile of the plasma channel; (**b**) and (**c**)**:** X-Ray Laser output spectrum with a strong laser line at 4.03 nm, in the "water window" [recorded by x-ray spectrometer on film (**b**), which scan is shown in (**c**)]. The inset in part (**c**) shows the level schematics in CV ions.