

Annual Report

Funding Programme:	Helmholtz Young Investigators Groups
Project ID No.:	VH-NG-804
Project Title:	Towards Laboratory-Based Ultrafast Bright EUV and X-ray Sources: High-Power Fiber Laser Frequency combs and Cavity Enhanced Ultrafast Optics
Group Leader:	Guoqing Chang
Helmholtz Centre:	DESY
Participating University:	University of Hamburg
Report Period (=Calendar Year):	08/2012-12/2012

<p>1) Group Structure <i>Please report briefly on the structure and personnel development of your group.</i></p>
<p>One PhD student joined the group in September 2012.</p>
<p>2) Network <i>Please describe how you / your research group are integrated within the Helmholtz Centre and the partner university (e.g. as member of committees).</i></p>
<p>We are closely collaborating with Professor Kaertner's group at DESY to work on table-top X-ray sources. We also work with Professor Christian Betzel from University of Hamburg to develop a new type of nanocrystal analyzer.</p>
<p>3) Satisfaction <i>How satisfied are you with the general working conditions provided by the Helmholtz Centre / partner university? Is there anything that meets your criticism?</i></p>
<p>Overall the working condition is very good. A laser community is emerging at DESY with many potential collaborators.</p>
<p>4) Scientific Progress / Milestones <i>How has your work plan progressed? Which important milestones could be achieved during the report period? Is the progress of your work in accordance with original planning or has the work plan been changed?</i></p>
<p>We are making progress in accordance with the original plan. We spent most of the effort on setting up the lab starting from an empty room in the brandnew building of the Center for Free-Electron Laser Science (CFEL). The lab is nearly ready for full fuction; ordered necessary instruments and components (optical, mechanical, and electrical) have arrived. During preparing the lab, we have accomplished two following milestones:</p> <ol style="list-style-type: none"> 1. We finished the design of the overall system. The proposed laser system is complicated and challenging. To optimize the system, we have carried out an extensive theoretical study by numerical modeling the whole system with all the realistic parameters. Such a detailed modeling allows us to leave enough experimental margin to the laser system, and lead us to select the right components from the right suppliers—a key step to ensure a robust laser system to meet the requirements for a table-top X-ray source. 2. We finished the construction of the seed oscillator. The frontend of the laser system is

<p>an Yb-fiber oscillator operating at 50-100 MHz repetition rate with >20 nm bandwidth. According to our numerical modeling, we have constructed such an Yb-fiber oscillator mode-locked by nonlinear polarization evolution. We already characterize the oscillator and the results indicate that this oscillator is suitable as a seeding laser to the subsequent fiber amplifier chain.</p>
<p>5) Financial Plan / Time Schedule <i>Can you comply with the financial plan and time schedule or do you see a need for adjustment?</i></p>
<p>At this stage, everything works out in terms of the financial plan and time schedule.</p>
<p>6) Status <i>Do you hold a joint Junior Professorship or a W2/W3 Professorship? Do you aim for such a position? What is the status of your negotiations in this respect?</i></p>
<p>No, I do not hold a joint Junior Professorship or a W2/W3 Professorship. Yes, I aim for such a position. The negotiation does not start yet.</p>
<p>7) Teaching Activities of the Group Leader</p>
<p>No teaching activities yet.</p>
<p>8) Publications of the Group</p>
<p>None.</p>
<p>9) External Funding</p>
<p>95,000 Euros equipment funding from NG-invest 2012</p>
<p>10) Patent Applications <i>No. of pending/granted patents</i></p>
<p>None.</p>
<p>11) Awards received by Group Members / Professorship Appointments offered to Group Leader</p>
<p>None.</p>