COHERENT XRAY SOURCE INFERRED FROM ELECTRONS ACCELERATED BY LASER

Von 2014-01-01 bis 2018-12-31, Abgeschlossenes Projekt

**Projektdetails**

<table>
<thead>
<tr>
<th>Gesamtkosten:</th>
<th>Thema(en):</th>
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<tbody>
<tr>
<td>EUR 2 500 000</td>
<td>ERC-AG-PE7 - ERC Advanced Grant - Systems and communication engineering</td>
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<tr>
<td><strong>EU-Beitrag:</strong></td>
<td><strong>Aufruf zur Vorschlagseinreichung:</strong></td>
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<tr>
<td>EUR 2 500 000</td>
<td>ERC-2013-ADG See other projects for this call</td>
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<td>Koordiniert in:</td>
<td>Finanzierungsprogramm:</td>
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<tr>
<td>France</td>
<td>ERC-AG - ERC Advanced Grant</td>
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**Ziel**

"Since the first laser discovery in 1960 and the first Free Electron Laser (FEL) in 1977, Linac based fourth generation light sources provide intense coherent fs pulses in the X-ray range for multidisciplinary investigations of matter. In parallel, Laser Wakefield Accelerator (LWFA) by using intense laser beams interacting with cm long plasmas can now provide high quality electron beams of very short bunches (few fs) with high peak currents (few kA). The so-called 5th generation light source aims at reducing the size and the cost of these FELs by replacing the linac by LWFA. Indeed, spontaneous emission from LWFA has already been observed, but the presently still rather large energy spread (1 %) and divergence (mrad) prevent from the FEL amplification. In 2012, two novel schemes in the transport proposed in the community, including my SOLEIL group, predict a laser gain increase by 3 or 4 orders of magnitudes. COXINEL aims at demonstrating the first lasing of an LWFA FEL and its detailed study in close interaction with future potential users. The key concept relies on an innovative electron beam longitudinal and transverse manipulation in the transport towards an undulator: a "demixing" chicane sorts the electrons in energy and reduces the spread from 1 % to a slice one of 0.1%, and the transverse density is maintained constant all along the undulator (supermatching). Simulations based on the performance of the 60 TW laser of the Laboratoire d’Optique Appliquée and existing undulators from SOLEIL suggest that the conditions for lasing are fulfilled. The SOLEIL environment also possesses the engineering fabrication capability for the actual realization of these theoretical ideas, with original undulators and innovative variable permanent compact magnets for the transport. COXINEL will enable to master in Europe advanced schemes scalable to shorter wavelengths and pulses, paving the way towards FEL light sources on laboratory size, for fs time resolved experiments."

**Verwandte Informationen**

| Bericht zusammenfassungen | Mid-Term Report Summary - COXINEL (COHERENT XRAY SOURCE INFERRED FROM ELECTRONS ACCELERATED BY LASER) |
Hauptforscher

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EU-Beitrag: EUR 2 500 000

Activity type: Research Organisations

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To know more

http://erc.europa.eu/

Fachgebiete

Information and communication technology applications - Network technologies - Physical sciences and engineering - Telecommunications

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