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Development of a high power coherent quantum cascade laser array mounted in extended-cavity system

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In the framework of the French Research Agency project called COCASE (#ANR-11-ASTR-002), GSMA and III-V Lab develop a coherent quantum cascade laser array to obtain high power emission. The principle of this source consists in the fabrication of multi-stripes arrays in order to obtain high power source. The paper will present multi-stripes dimensioning and modelling, thermal and optical considerations. The number of emitters has been tested from 2 up to 32. N supermodes are obtained for N stripes and highest order is attended for all configurations. The main characteristic of this kind of source is that in far-field an anti-symmetrical signature is obtained with at least two lobes. Far-field emission measured with a 16 emitters array around 7.8 μm will be presented. In this case 2 lobes on each part of the laser axis may be observed and there is no light in front of the source. This source has no modes switching, no multi-modal behavior and supermode operation is active along the current range thus there are no coherence loss. In a second part we will present first results obtained with this source mounted in an external cavity system. A grating is aligned with one lobe of the source. Thus a Littrow-configuration is designed that permit to obtain a wide tunability of the source. Next step will be to obtain cw emission. Then the technological robustness of the source will be useful when implemented in photoacoustic spectrometers where signal is proportional to absorbed power.

Biography

Raphael Vallon has completed his PhD in 2007 at the age of 26 years from University of Lyon - France and postdoctoral studies at Orsay University (1 yr) and at ONERA with financial support of CNES (2 yrs). He is member of the team "laser spectroscopy and applications" from GSMA - Reims since 2010 (www.univ-reims.fr/GSMA/SLA). The team has published more than 50 papers in reputed journals since 2004 and more than 10 patents.

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