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A New Technique to Electro-Optically Q-switch Uniaxial Gain Materials.

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Abstract content
 (Max 300 words)
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We introduce a new technique of Electro-Optic Q-switching which exploits the polarization dependence of a uniaxial gain medium. Conventional Electro-Optic Q-switched cavities require both a polarizer and a wave plate in addition to an Electro-Optic Modulator (EOM) which rotates the beam polarization within a few nanoseconds. The new technique eliminates the need for a polarizer, which is an advantage for short pulse, high peak power Q switched lasers. This is because polarizers are susceptible to damage and can significantly lengthen the cavity, which increases the output pulse length.

Uniaxial gain materials like Nd:YVO₄ have different thermo-dioptic constants in two crystallographic directions, which causes the two polarization states to experience different thermal lens strengths for a-cut crystals. The cavity can be switched between stable and unstable states by rotating the polarization with a Pockels cell. The results in a rapid change in the cavity quality, which Q-switches the resonator.

The presentation will first review conventional Electro-Optic Q-switched methods after which the new technique will be introduced. It will then be shown how the new technique was implemented in a short Nd:YVO₄ cavity. The experiments confirmed that the new technique is viable and operating regimes, advantages and disadvantages of the new technique will be presented.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD)?

PhD

Main supervisor (name and email) and his / her institution

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Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

Yes

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