Many-mode Floquet technique for two component superluminal light

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Novel effects of superluminal light are reported based on the results obtained using the generalized Floquet technique [1]. In previously proposed schemes [2] two superluminal pulses have different type of symmetry: the seed pulse generates a much weaker conjugated pulse. We propose and describe an alternative scheme for two-component superluminal light, which is an extension of the scheme described in [3]. Instead of one gain doublet and one probe field we use two gain doublets and two probe fields (Fig. 1). We adopted the many-mode Floquet technique to obtain the master equations that allow the treatment of complicated configurations of a number of laser fields coupled with atomic states. The main advantage of the proposed scheme is the flexibility in controlling the two superluminal pulses by changing parameters of the gain doublets. Our scheme has an intriguing property: when only one probe field is incident (a seed field), then the second field will be generated and will appear at the end of the atom cloud before the main primary field enters it.

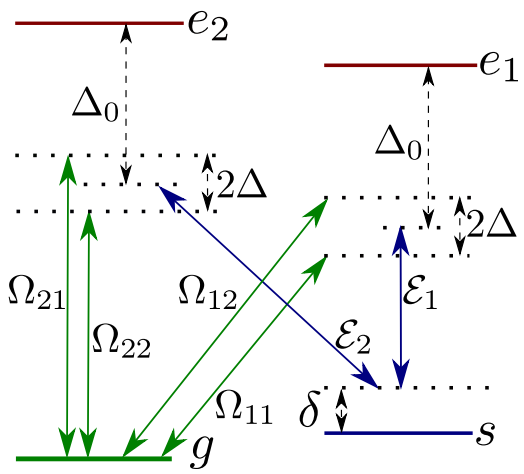

Figure 1: Raman amplification schemes with a double probe field.

We acknowledge the support by the EU FP7 Centre of Excellence project FOTONIKA-LV, the EU FP7 IRSES project COLIMA, the trilateral TLL project by of the Latvian Research Council and the project TAP LLT 01/2012 of the Research Council of Lithuania.

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