

# The Renormalization of the Energetical Spectrum and the Peculiarities of High Density Paraexciton Luminescence Band

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## Abstract

The renormalization of the energetical spectrum of paraexcitons in the presence of a Bose-Einstein condensate (BEC) of orthoexcitons or at least of their saturation is studied. Due to the conversion of a pair of orthoexcitons into a pair of paraexcitons an absolute instability in the energy spectrum of paraexcitons appears. The appeared paraexcitons can be downscattered by optical phonons  $T_5$  ( $88\text{ cm}^{-1}$ ) into a state above the bottom of the paraexciton band. This can be the reason of the observed peculiarities in the paraexciton luminescence band. On this basis a new explanation of the appearance of an extra peak in the luminescence spectrum of the uniaxially stressed  $\text{Cu}_2\text{O}$  crystal is suggested. It has the same origin as the bump of the luminescence band in unstrained crystals. The spectral positions of the extra peak and of the bump differ due to the diminution of the ortho-para splitting in uniaxially stressed crystals. The difference of their widths is due to different densities of the condensed orthoexcitons in stressed and unstrained crystals.