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PHOTON GATED HOLE BURNING IN THE $^7F_0 \rightarrow ^5D_2$ ABSORPTION OF BaCIF : Sm$^{2+}$

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Spectral hole burning in solids is a selective bleaching of a small portion of an inhomogeneously broadened optical transition by a laser. In the photon gated holeburning process spectral holes are burned in two steps. The first is provided by a narrow band laser resonant with the inhomogeneously broadened transition and the second (gating) can be initiated by a broad band light source. Photon gated spectral hole burning was reported recently in $^7F_0 \rightarrow ^5D_0$ and $^7F_0 \rightarrow ^5D_1$ absorption lines of Sm$^{2+}$ in BaCIF (1). In this poster we report on the spectral holeburning behaviour of $^1F_0 \rightarrow ^5D_2$ transition. We found that even in absence of additional light source for gating, permanent holes can be burned. This self gating behaviour is consistent with the observation that the optimum frequency following $^5D_0$ excitation is $\approx 22 \, 000 \, \text{cm}^{-1}$ so that two photons of energy $^5D_2 - ^7F_0$ are sufficient to produce photoionisation. We have analysed the light intensity dependance of hole area and a simple model indicate that the electron transfer following the photoionisation is strongly dependant on the ion - electron trap distance.

We have used this persistent spectral hole burning to measure the stark effect for $^1F_0 \rightarrow ^5D_2(\Delta_1)$ and $^5D_2(\Delta)$ levels and find stark shifts very similar to those reported earlier for transition to $^5D_0$ and $^5D_1$ (2).
