

On new physics contributions to $H \rightarrow l^+ l^- \gamma$

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Motivated by a small (probably fading away) but intriguing excess observed in the decay mode $H \rightarrow l^+ l^- \gamma$ reported by both the ATLAS and CMS collaborations, I explore the possibility that new physics contributes directly to the effective $H \rightarrow l^+ l^- \gamma$ coupling rather than modifying the Z peak. Concretely, I consider a dimension-8 operator that could arise from new particles via box diagrams. Such non-resonant contribution may provide an alternative origin for current or future excesses. I examine how experimental cuts may distinguish between possible modifications of the Z peak and non-resonant contributions. Current measurements requires that the new physics scale, if any, is relatively low ($\Lambda \sim v$). I illustrate this scenario using a simplified model in the form a new scalar field coupled to vector-like fermions, a model motivated by the dark matter problem, and discuss some of its other experimental constraints or predictions.

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