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Complex Scalar Singlet Model Benchmarks

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The complex scalar singlet extension has three massive scalar states with interesting decay chains which will depend on the exact mass hierarchy of the system. We find maximum branching ratios for resonant double Standard Model-like Higgs production, resonant production of a Standard Model-like Higgs and a new scalar, and double resonant new scalar production. This is particularly interesting because instead of direct production, the main production of a new scalar resonance may be from the s -channel production and decay of another scalar resonance. That is, it is possible for discovery of new scalar resonances to be from the cascade of one resonance to another. We choose our benchmark points to have to have a large range of signatures: multi- b production, multi- W and Z production, and multi-125 GeV SM-like Higgs production. These benchmark points can provide various spectacular signatures that are consistent with current experimental and theoretical bounds.

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