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Collider and GW complementarity in the 2HDM

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We study electroweak phase transition and resultant GWs of a CP conserving 2HDM with a softly broken Z_2 symmetry. We analysed the parameter space of both type I and type II 2hdm without relying on any decoupling limit. We observe $M_{H^\pm} \approx M_H$ or $M_{H^\pm} \approx M_A$ favours SFOEWPT in 2HDM. In addition to di-Higgs production, scalar to fermion decay channel is also important to probe phase transition behaviour in 2HDM. We also comment about the shape of potential leading to SFOEWPT in 2hdm.

Primary authors: KALADHARAN, AJAY (Oklahoma State University); GONÇALVES, Dorival (Oklahoma State University); WU, Yongcheng (Oklahoma State University)

Presenter: KALADHARAN, AJAY (Oklahoma State University)

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