Iranian Journal of Physics Research, Vol. 22, No. 4, 2023
DOI: 10.47176/ijpr.22.4.71523

Simultaneous observation of neutral Higgs particles with different masses in 2HDM at future colliders

M Hashemi*

Physics department, School of sciences, Shiraz University, Shiraz, Iran

E-mail: hashemi_mj@shirazu.ac.ir

(Received 9 July 2022 ; in final form 20 August 2022)

Abstract

In this paper, the two Higgs doublet model (2HDM) is investigated for simultaneous observation of the signals of the neutral Higgs particles. The goal of this work is to introduce model types which result in observable signals for these particles at future lepton colliders. Then for every selected type, the parameter space of the model is investigated and the mass regions of the neutral Higgs bosons which are suitable for finding their signals are identified. Introducing several example values for the masses of these particles, events of electron-positron collisions with center of mass energy of 1000 GeV are generated, and taking into account the effects of a typical detector, they are analyzed and the Higgs particles masses are reconstructed. Plots obtained in this analysis are one of the richest possible plots for the Higgs particles signals and provide information about the Z particle mass, the light Higgs particle with the mass of 125 GeV and heavy neutral Higgs particles (H, A) at the same time. Finally, estimations about the needed amount of data for the observation of the signal of the neutral Higgs particles are provided.

Keywords: Higgs particle, lepton colliders, 2HDM

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