

**Title:** The geometric picture of generalized-CP and Higgs-family transformations in the two-Higgs-doublet model

**Author(s):** Ferreira, P. M.<sup>1,2</sup>; Haber, Howard E.<sup>3</sup>; Maniatis, M.<sup>4</sup>; Nachtmann, O.<sup>4</sup>; Silva, João P.<sup>1,5</sup>

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**Abstract:** In the two-Higgs-doublet model (THDM), generalized-CP transformations ( $\phi(i) \rightarrow X_{ij} \phi^*(j)$  where  $X$  is unitary) and unitary Higgs-family transformations ( $\phi(i) \rightarrow U_{ij} \phi(j)$ ) have recently been examined in a series of papers. In terms of gauge-invariant bilinear functions of the Higgs fields  $\phi(i)$ , the Higgs-family transformations and the generalized-CP transformations possess a simple geometric description. Namely, these transformations correspond in the space of scalar-field bilinears to proper and improper rotations, respectively. In this formalism, recent results relating generalized CP transformations with Higgs-family transformations have a clear geometric interpretation. We will review what is known regarding THDM symmetries, as well as derive new results concerning those symmetries, namely how they can be interpreted geometrically as applications of several CP transformations.

**Author Keywords:** Symmetries; CP; Two-Higgs Doublet Models

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**Reprint Address:** Ferreira, PM (reprint author), Inst Super Engn Lisboa, Rua Conselheiro Emídio Navarro, P-1959007 Lisbon, Portugal.

**Addresses:**

1. Inst Super Engn Lisboa, P-1959007 Lisbon, Portugal
2. Univ Lisbon, Ctr Fis Teor & Computac, P-1649003 Lisbon, Portugal
3. Univ Calif Santa Cruz, Santa Cruz Inst Particle Phys, Santa Cruz, CA 95064 USA
4. Inst Theoret Phys, D-69120 Heidelberg, Germany
5. Inst Super Tecn, Ctr Fis Teor Particulas, P-1049001 Lisbon, Portugal

**E-mail Address:** ferreira@cii.fc.ul.pt; haber@scipp.ucsc.edu; m.maniatis@thphys.uni-heidelberg.de; o.nachtmann@thphys.uni-heidelberg.de; jpsilva@cftp.ist.utl.pt

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