
\mathcal{I} mplementation of $2\mathcal{HDM}$ in HDECAY

- **Implementation in** HDECAY

Djouadi,Kalinowski,MM,Spira

- **Input parameters:**

$$\alpha, \tan \beta, M_h, M_H, M_A, M_{H^\pm}, M_{12}^2$$

- **Implemented decays:**

- * QCD corrections to gluonic, fermionic, photonic decays
- * Off-shell decays into $t\bar{t}$, WW , ZZ ,
off-shell Higgs-to-Higgs decays,
off-shell Higgs-to-(Higgs+ V) decays

- **Implemented models:** Type I and Type II (so far)

Input File

```
2HDM = 1
HIGGS = 5
:
*****
***** 2 Higgs Doublet Model *****
TYPE; 1 (I), 2 (II)

TYPE = 2
TGBET2HDM= 1.5D0
ALPHA_H = -0.14D0
MHL = 125.D0
MHH = 300.D0
MHA = 340.D0
MH+- = 360.D0
M_122 = 256.D2
*****
:
:
```

⇒ Output files: br.l1-3_HDM, br.h1-3_2HDM, br,a1-3_2HDM , br.c1_2HDM, br.c2_2HDM,
br.input

Output File

br.l1_2HDM:

MHL	BB	TAU TAU	MU MU	SS	CC	TT
125.000	0.1073	0.9975E-02	0.3531E-04	0.4225E-04	0.1014	0.000

br.l2_2HDM:

MHL	GG	GAM GAM	Z GAM	WW	ZZ
125.000	0.3046	0.3561E-02	0.2896E-02	0.4179	0.5221E-01

br.l3_2HDM:

MHL	AA	Z A	W+- H-+	WIDTH
125.000	0.000	0.000	0.000	0.1641E-02

Webpage

HDECAY for Two Higgs Doublet Models

This program is a modified version of HDECAY Version 5.11.
It allows for the calculation of the partial decay widths and branching ratios in the 2HDM.

Released by: Abdelhak Djouadi, Jan Kalinowski, Margarete Mühlleitner and Michael Spira

Program: HDECAY for 2HDM based on HDECAY 5.11

When you use this program, please cite the following references:

HDECAY: [A. Djouadi, J. Kalinowski, M. Spira, Comput.Phys.Commun. 108 \(1998\) 56](#)

An update of HDECAY: [A. Djouadi, J. Kalinowski, Margarete Muhlleitner, M. Spira, in arXiv:1003.1643](#)

Informations on the Program:

- Short explanations on the program are given [here](#).
- To be advised about future updates or important modifications concerning the 2HDM version, send an E-mail to margarete.muehleitner@kit.edu.
- Modifs/corrected bugs are indicated explicitly [in this file](#).

Downloading the files needed for HDECAY for 2HDM:

- [hdecay2hdm.tar.gz](#) contains the program package files: the input file hdecay.in; hdecay.f, dmb.f, elw.f, feynhiggs.f, haber.f, hgaga.f, hgg.f, hsqsq.f, susylha.f; a makefile; a compilation.

Example for an output file: