

Topology Analysis ^{*†‡§}

(v2.8.8)

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[†]This package is implemented referring to a program called TOPO, which is first developed by Prof. Shuxian Du from Zhengzhou University and later extended and maintained by Prof. Gang Li from Institute of High Energy Physics, Chinese Academy of Sciences. The TOPO program has been widely used by colleagues in BESIII collaboration. Several years ago, when I was a Ph.D. student working on the BESIII experiment, I learned the idea of topology analysis and a lot of programming techniques from the TOPO program. So, I really appreciate the original works of Prof. Du and Prof. Li very much. To meet my own needs and to practice developing analysis tools with C++, ROOT, and LaTeX, I wrote the package from scratch. At that time, the package functioned well but was relatively simple. At the end of 2017, my co-supervisor, Prof. Chengping Shen reminded me that it could be a useful tool for the Belle II experiment as well. So, I revised and extended it, making it more well-rounded and suitable for the Belle II experiment. Now, it also applies to many other similar high energy physics experiments. Here, I would like to thank Prof. Du and Prof. Li for their original works, and Prof. Shen for his suggestion, guidance, support, and encouragement.

[‡]Besides, I would like to thank all of the people who have helped me in the development of the program. I am particularly grateful to Prof. Xingtao Huang for his comments on the principles and styles of the program, to Remco de Boer for his suggestions on the tex output and the use of GitHub, and to Xi Chen for his discussions on the core algorithms. I am especially indebted to Prof. Xiqing Hao, Longke Li, Xiaoping Qin, Ilya Komarov, Yubo Li, Guanda Gong, Suxian Li, Junhao Yin, Prof. Xiaolong Wang, Yeqi Chen, Hannah Wakeling, Hongrong Qi, Hui Li, Ning Cao, Sanjeeda Bharati Das, Kazuki Kojima, Tingting Han, Fang Yan, Lin Wang, and Meiru An for their advice in extending and perfecting the program. Also, I thank Xi'an Xiong, Runqiu Ma, Wencheng Yan, Sen Jia, Lu Cao, Dong Liu, Hongpeng Wang, Jiawei Zhang, Jiajun Liu, Maoqiang Jing, Yi Zhang, Wei Shan, and Yadi Wang for their efforts in helping me test the program.

[§]The paper on the tool has been published by *Computer Physics Communications*. You can find this paper and the preprint corresponding to it in the links [Comput. Phys. Commun. 258 \(2021\) 107540](#) and [arXiv:2001.04016](#), respectively. If the tool really helps your researches, we would appreciate it very much if you could cite the paper in your publications.

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Table 1: Decay trees and their respective initial-final states.

rowNo	decay tree (decay initial-final states)	iDcyTr	nEtr	nCEtr
1	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow e^+ \nu_e D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^- \bar{D}^0, D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow \pi^0 \pi^- K^+$ ($\Upsilon(4S) \rightarrow e^+ \nu_e \pi^0 \pi^0 \pi^0 \pi^- \pi^- K^+$)	396	4	4
2	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow e^- \bar{\nu}_e D^+, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^+ \rightarrow \pi^0 \pi^+ \bar{K}^*, \bar{K}^* \rightarrow \pi^+ K^-$ ($\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ K^-$)	367	3	7
3	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow e^- \bar{\nu}_e D^+, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^+ \rightarrow \pi^+ \pi^+ K^-$ ($\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ K^-$)	23	2	9
4	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow e^+ \nu_e D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^0 D^-, D^0 \rightarrow \pi^0 \pi^0, D^- \rightarrow \mu^- \bar{\nu}_\mu K^0,$ $K^0 \rightarrow K_L^0$ ($\Upsilon(4S) \rightarrow e^+ \nu_e \mu^- \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 K_L^0$)	72	2	11
5	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \mu^- \bar{\nu}_\mu D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^0 D^+, D^+ \rightarrow \pi^+ \pi^+ K^-$ ($\Upsilon(4S) \rightarrow \mu^- \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ K^-$)	78	2	13
6	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \rho^0 \pi^- D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \rho^0 \rightarrow \pi^+ \pi^-, D^{*+} \rightarrow \pi^+ D^0,$ $D^0 \rightarrow K^- a_1^+, a_1^+ \rightarrow \pi^+ f_0(600)$ ($\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- K^- f_0(600)$)	132	2	15
7	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \mu^- \bar{\nu}_\mu D^+, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^+ \rightarrow \pi^+ \pi^+ K^-$ ($\Upsilon(4S) \rightarrow \mu^- \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ K^-$)	199	2	17
8	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \mu^+ \nu_\mu D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^- \bar{D}^0, D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow \pi^0 \pi^- K^+$ ($\Upsilon(4S) \rightarrow \mu^+ \nu_\mu \pi^0 \pi^0 \pi^0 \pi^- \pi^- K^+$)	244	2	19
9	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow D^{*-} a_1^+, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^0 D^-, a_1^+ \rightarrow \pi^0 \rho^+, D^0 \rightarrow \pi^0 \pi^0,$ $D^- \rightarrow e^- \bar{\nu}_e K^0, \rho^+ \rightarrow \pi^0 \pi^+, K^0 \rightarrow K_L^0$ ($\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+$)	351	2	21
10	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \mu^+ \nu_\mu D^-, \bar{B}^0 \rightarrow \pi^0 D^0, D^- \rightarrow \pi^- \pi^- K^+, D^0 \rightarrow \pi^0 \pi^0$ ($\Upsilon(4S) \rightarrow \mu^+ \nu_\mu \pi^0 \pi^0 \pi^0 \pi^- \pi^- K^+$)	446	2	23
11	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \mu^- \bar{\nu}_\mu D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^+ D^0, D^0 \rightarrow K^- a_1^+,$ $a_1^+ \rightarrow \rho^0 \pi^+, \rho^0 \rightarrow \pi^+ \pi^- \gamma^F$ ($\Upsilon(4S) \rightarrow \mu^- \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- K^- \gamma^F$)	511	2	25
12	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow e^- \bar{\nu}_e D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^+ D^0, D^0 \rightarrow \pi^0 \pi^+ K^-$ ($\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ K^-$)	550	2	27
13	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow D^{*-} D_s^{*+}, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^- \bar{D}^0, D_s^{*+} \rightarrow \pi^0 D_s^+, D^0 \rightarrow \pi^0 \pi^0,$ $\bar{D}^0 \rightarrow \pi^0 \pi^- K^+, D_s^+ \rightarrow \rho^+ \eta', \rho^+ \rightarrow \pi^0 \pi^+, \eta' \rightarrow \gamma \gamma$ ($\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^- \pi^- K^+ \gamma \gamma$)	3	1	28
14	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^+ \pi^- D^{*+} \Sigma^0 \bar{\Sigma}^-, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^0 D^+, \Sigma^0 \rightarrow \Lambda \gamma,$ $\bar{\Sigma}^- \rightarrow \pi^- \bar{n}, D^+ \rightarrow \mu^+ \nu_\mu \bar{K}^*, \Lambda \rightarrow \pi^- p, \bar{K}^* \rightarrow \pi^0 \bar{K}^0, \bar{K}^0 \rightarrow K_L^0$ ($\Upsilon(4S) \rightarrow \mu^+ \nu_\mu \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^- \pi^- \pi^- \bar{n} p \gamma$)	4	1	29

rowNo	decay tree (decay initial-final states)	iDcyTr	nEtr	nCEtr
15	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^0 \rho^0 \bar{K}^0 D^+ D^-, \bar{D}^0 \rightarrow \pi^0 \pi^0, \rho^0 \rightarrow \pi^+ \pi^-, \bar{K}^0 \rightarrow K_S^0,$ $D^+ \rightarrow \pi^+ \bar{K}_1^0, D^- \rightarrow K_L^0 K^-, K_S^0 \rightarrow \pi^+ \pi^-, \bar{K}_1^0 \rightarrow \pi^0 \bar{K}^*, \bar{K}^* \rightarrow \pi^0 \bar{K}^0, \bar{K}^0 \rightarrow K_L^0$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 K_L^0 \pi^+ \pi^+ \pi^- \pi^- K^-)$	5	1	30
16	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow \pi^+ \pi^- \bar{K}^0 \gamma^F \gamma^F, D^0 \rightarrow \pi^0 \pi^0, \bar{K}^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \gamma^F \gamma^F)$	6	1	31
17	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^- \bar{\Delta}^0 \Sigma_c^+, \bar{D}^0 \rightarrow \pi^0 \pi^0, \bar{\Delta}^0 \rightarrow \pi^+ \bar{p}, \Sigma_c^+ \rightarrow \pi^0 \Lambda_c^+,$ $\Lambda_c^+ \rightarrow \pi^0 \pi^+ \Sigma^{*0}, \Sigma^{*0} \rightarrow \pi^0 \Lambda, \Lambda \rightarrow \pi^- p$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- p \bar{p})$	7	1	32
18	$\Upsilon(4S) \rightarrow B^0 B^0, B^0 \rightarrow \pi^0 \bar{D}^0, B^0 \rightarrow K^0 D^+ D^-, \bar{D}^0 \rightarrow \pi^0 \pi^0, K^0 \rightarrow K_L^0, D^+ \rightarrow e^+ \nu_e \bar{K}^0,$ $D^- \rightarrow \pi^0 \pi^- K^*, \bar{K}^0 \rightarrow K_S^0, K^* \rightarrow \pi^- K^+ \gamma^F, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow e^+ \nu_e \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^- \pi^- K^+ \gamma^F)$	8	1	33
19	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow K^{*-} D^{*+} \bar{D}^{*0}, \bar{D}^0 \rightarrow \pi^0 \pi^0, K^{*-} \rightarrow \pi^- \bar{K}^0, D^{*+} \rightarrow \pi^+ D^0,$ $\bar{D}^{*0} \rightarrow \pi^0 \bar{D}^0, \bar{K}^0 \rightarrow K_S^0, D^0 \rightarrow \pi^0 \bar{K}^*, \bar{D}^0 \rightarrow \rho^- K^{*+}, K_S^0 \rightarrow \pi^+ \pi^- \gamma^F, \bar{K}^* \rightarrow \pi^0 \bar{K}^0,$ $\rho^- \rightarrow \pi^0 \pi^-, K^{*+} \rightarrow \pi^+ K^0, \bar{K}^0 \rightarrow K_L^0, K^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \gamma^F)$	9	1	34
20	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow e^- \bar{\nu}_e D^+ \gamma^F, D^0 \rightarrow \pi^0 \pi^0, D^+ \rightarrow \pi^+ \pi^+ K^- \gamma^F$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ K^- \gamma^F \gamma^F)$	10	1	35
21	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow D^{*-} D_{s1}^-, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*-} \rightarrow \pi^+ D^0, D_{s1}^- \rightarrow \pi^0 D_s^{*-},$ $D^0 \rightarrow \rho^0 \rho^0, \pi^0 \rightarrow e^+ e^- \gamma^F, D_s^{*-} \rightarrow D_s^- \gamma, \rho^0 \rightarrow \pi^+ \pi^-, \rho^0 \rightarrow \pi^+ \pi^- \gamma^F, D_s^- \rightarrow \mu^- \bar{\nu}_\mu \eta,$ $\eta \rightarrow \gamma \gamma$ $(\Upsilon(4S) \rightarrow e^+ e^- \mu^- \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \gamma^F \gamma^F \gamma \gamma \gamma)$	11	1	36
22	$\Upsilon(4S) \rightarrow B^0 B^0, B^0 \rightarrow \pi^0 \bar{D}^0, B^0 \rightarrow \rho^0 \pi^+ \pi^+ \pi^- D^{*-}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \rho^0 \rightarrow \pi^+ \pi^-, D^{*-} \rightarrow \pi^0 D^-,$ $D^- \rightarrow \pi^- \pi^- K^+ \gamma^F$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \pi^- K^+ \gamma^F)$	12	1	37
23	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \bar{K}^* D^0, \bar{D}^0 \rightarrow \pi^0 \pi^0, \bar{K}^* \rightarrow \pi^0 \bar{K}^0, D^0 \rightarrow \pi^0 \pi^+ \pi^- \bar{K}^*,$ $\bar{K}^0 \rightarrow K_L^0, \bar{K}^* \rightarrow \pi^0 \bar{K}^0, \bar{K}^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^- \pi^-)$	13	1	38
24	$\Upsilon(4S) \rightarrow B^0 B^0, B^0 \rightarrow \pi^0 \bar{D}^0, B^0 \rightarrow \rho^0 \rho^0 \pi^+ D^{*-}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \rho^0 \rightarrow \pi^+ \pi^-, \rho^0 \rightarrow \pi^+ \pi^-,$ $D^{*-} \rightarrow \pi^- \bar{D}^0, \bar{D}^0 \rightarrow \pi^+ \pi^- K_S^0 \gamma^F, K_S^0 \rightarrow \pi^0 \pi^0$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- \gamma^F)$	14	1	39
25	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \bar{K}_1^0 \psi', \bar{D}^0 \rightarrow \pi^0 \pi^0, \bar{K}_1^0 \rightarrow \pi^+ K^{*-}, \psi' \rightarrow \chi_{c1} \gamma,$ $K^{*-} \rightarrow \pi^- \bar{K}^0, \chi_{c1} \rightarrow \rho^0 \pi^+ \pi^+ \pi^- \pi^- \rho^- \eta, \bar{K}^0 \rightarrow K_L^0, \rho^0 \rightarrow \pi^+ \pi^-, \rho^- \rightarrow \pi^0 \pi^-, \eta \rightarrow \gamma \gamma$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- \gamma \gamma \gamma)$	15	1	40
26	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^0 \rho^- \eta \omega D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \rho^- \rightarrow \pi^0 \pi^-, \eta \rightarrow \gamma \gamma,$ $\omega \rightarrow \pi^0 \pi^+ \pi^-, D^{*+} \rightarrow \pi^+ D^0, D^0 \rightarrow K^- a_1^+, a_1^+ \rightarrow \rho^0 \pi^+, \rho^0 \rightarrow \pi^+ \pi^- \gamma^F$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- K^- \gamma^F \gamma \gamma)$	16	1	41

rowNo	decay tree (decay initial-final states)	iDcyTr	nEtr	nCEtr
27	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^+ \pi^+ \pi^- \pi^- \rho^+ D^- \gamma^F, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^+ \rightarrow \pi^0 \pi^+, D^- \rightarrow K_L^0 a_1^-, D^0 \rightarrow \pi^0 \pi^0,$ $a_1^- \rightarrow \pi^+ \pi^- \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- \gamma^F)$	17	1	42
28	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^0 \pi^+ K^{*-} D^{*0} \bar{D}^{*0}, \bar{D}^0 \rightarrow \pi^0 \pi^0, K^{*-} \rightarrow \pi^0 K^-, D^{*0} \rightarrow D^0 \gamma,$ $\bar{D}^{*0} \rightarrow \pi^0 \bar{D}^0, D^0 \rightarrow e^+ \nu_e \pi^-, \bar{D}^0 \rightarrow \pi^0 \pi^- K^+$ $(\Upsilon(4S) \rightarrow e^+ \nu_e \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^- \pi^- K^+ K^- \gamma)$	18	1	43
29	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow \pi^0 \pi^+ \pi^- \pi^- D^{*+}, D^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^+ D^0, D^0 \rightarrow \pi^0 \pi^+ K^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- K^-)$	19	1	44
30	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \pi^0 \pi^+ \pi^- \bar{K}^0 K^+ D^-, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{K}^0 \rightarrow K_S^0, D^- \rightarrow K_L^0 K^{*-}, D^0 \rightarrow \pi^0 \pi^0,$ $K_S^0 \rightarrow \pi^+ \pi^-, K^{*-} \rightarrow \pi^- \bar{K}^0, \bar{K}^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^0 \pi^0$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^- \pi^- K^+)$	20	1	45
31	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow \omega \bar{K}^0 \eta_c, D^0 \rightarrow \pi^0 \pi^0, \omega \rightarrow \pi^0 \pi^+ \pi^-, \bar{K}^0 \rightarrow K_S^0,$ $\eta_c \rightarrow \pi^0 \pi^0 \pi^0 \rho^0 \pi^+ \pi^- \eta, K_S^0 \rightarrow \pi^+ \pi^-, \rho^0 \rightarrow \pi^+ \pi^-, \eta \rightarrow \gamma \gamma$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- \gamma \gamma)$	21	1	46
32	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow D^{*0} p \bar{\Delta}^+, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*0} \rightarrow \pi^0 D^0, \bar{\Delta}^+ \rightarrow \pi^0 \bar{p},$ $D^0 \rightarrow \pi^0 \pi^+ \pi^- K^+ K^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^- K^+ K^- p \bar{p})$	22	1	47
33	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^0 \rho^+ \rho^+ \rho^- n \bar{p}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \rho^+ \rightarrow \pi^0 \pi^+, \rho^+ \rightarrow \pi^0 \pi^+,$ $\rho^- \rightarrow \pi^0 \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- n \bar{p})$	0	1	48
34	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \bar{K}^{*0} \bar{p} \Lambda_c^+, \bar{D}^0 \rightarrow \pi^0 \pi^0, \bar{K}^{*0} \rightarrow K_L^0, \Lambda_c^+ \rightarrow \pi^0 p$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 p \bar{p})$	24	1	49
35	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^+ \rho^- D^{*0} p \bar{p}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \rho^- \rightarrow \pi^0 \pi^-, D^{*0} \rightarrow \pi^0 D^0,$ $\pi^0 \rightarrow e^+ e^- \gamma^F, D^0 \rightarrow \pi^0 \pi^+ K^-$ $(\Upsilon(4S) \rightarrow e^+ e^- \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^- K^- p \bar{p} \gamma^F)$	25	1	50
36	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow D^{*+} D_s^{*-}, D^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^+ D^0, D_s^{*-} \rightarrow D_s^- \gamma,$ $D^0 \rightarrow \pi^0 \pi^+ \pi^- \bar{K}^*, D_s^- \rightarrow \pi^+ \pi^- \pi^- K_S^0, \bar{K}^* \rightarrow \pi^+ K^-, K_S^0 \rightarrow \pi^0 \pi^0$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- K^- \gamma)$	26	1	51
37	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^+ \Delta^0 \bar{\Sigma}_c^-, \bar{B}^0 \rightarrow \pi^0 D^0, \Delta^0 \rightarrow \pi^- p, \bar{\Sigma}_c^- \rightarrow \pi^0 \bar{\Lambda}_c^-, D^0 \rightarrow \pi^0 \pi^0,$ $\bar{\Lambda}_c^- \rightarrow \eta K^0 \bar{p}, \eta \rightarrow \pi^+ \pi^- \gamma^F, K^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- p \bar{p} \gamma^F)$	27	1	52
38	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \tau^- \bar{\nu}_\tau D^+, \bar{D}^0 \rightarrow \pi^0 \pi^0, \tau^- \rightarrow e^- \bar{\nu}_e \nu_\tau, D^+ \rightarrow e^+ \nu_e \bar{K}^0,$ $\bar{K}^0 \rightarrow K_L^0$ $(\Upsilon(4S) \rightarrow e^+ e^- \nu_e \bar{\nu}_e \nu_\tau \bar{\nu}_\tau \pi^0 \pi^0 K_L^0)$	28	1	53

rowNo	decay tree (decay initial-final states)	iDcyTr	nEtr	nCEtr
39	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow D^- D_{s0}^{*+}, \bar{B}^0 \rightarrow \pi^0 D^0, D^- \rightarrow K_L^0 K^{*-}, D_{s0}^{*+} \rightarrow \pi^0 D_s^+, D^0 \rightarrow \pi^0 \pi^0,$ $K_L^0 \rightarrow \mu^+ \nu_\mu \pi^-, K^{*-} \rightarrow \pi^- K^0, D_s^+ \rightarrow \rho^+ \eta, \bar{K}^0 \rightarrow K_S^0, \rho^+ \rightarrow \pi^0 \pi^+, \eta \rightarrow \pi^0 \pi^0 \pi^0,$ $K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \mu^+ \nu_\mu \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \pi^-)$	29	1	54
40	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow K^0 \Sigma^0 \bar{\Xi}_c^{\prime 0}, \bar{B}^0 \rightarrow \pi^0 D^0, K^0 \rightarrow K_L^0, \Sigma^0 \rightarrow \Lambda \gamma, \bar{\Xi}_c^{\prime 0} \rightarrow \bar{\Xi}_c^0 \gamma,$ $D^0 \rightarrow \pi^0 \pi^0, \Lambda \rightarrow \pi^- p, \bar{\Xi}_c^0 \rightarrow K^0 \bar{\Lambda}, K^0 \rightarrow K_S^0, \bar{\Lambda} \rightarrow \pi^+ \bar{p}, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^- \pi^- p \bar{p} \gamma \gamma)$	30	1	55
41	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^+ \pi^- \rho^+ \eta \eta' D^-, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^+ \rightarrow \pi^0 \pi^+, \eta \rightarrow \pi^0 \pi^+ \pi^-, \eta' \rightarrow \omega \gamma,$ $D^- \rightarrow \pi^0 \pi^+ \pi^- \pi^- K^0, D^0 \rightarrow \pi^0 \pi^0, \omega \rightarrow \pi^0 \pi^+ \pi^-, K^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- \pi^- \gamma)$	31	1	56
42	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \mu^+ \nu_\mu \pi^- \bar{D}^{*0}, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{D}^{*0} \rightarrow \bar{D}^0 \gamma, D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow K^+ a_1^-,$ $a_1^- \rightarrow \pi^0 \rho^-, \rho^- \rightarrow \pi^0 \pi^-$ $(\Upsilon(4S) \rightarrow \mu^+ \nu_\mu \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^- \pi^- K^+ \gamma)$	32	1	57
43	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow D^{*-} D_s^{*+}, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow D^- \gamma, D_s^{*+} \rightarrow D_s^+ \gamma, D^0 \rightarrow \pi^0 \pi^0,$ $D^- \rightarrow e^- \bar{\nu}_e K^* \gamma^F, D_s^+ \rightarrow \rho^+ \phi, K^* \rightarrow \pi^- K^+, \rho^+ \rightarrow \pi^0 \pi^+, \phi \rightarrow K^+ K^-$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^+ \pi^- K^+ K^- \gamma^F \gamma \gamma)$	33	1	58
44	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \rho^0 D^{*-} D_s^{*+}, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^0 \rightarrow \pi^+ \pi^-, D^{*-} \rightarrow \pi^- \bar{D}^0, D_s^{*+} \rightarrow D_s^+ \gamma,$ $D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow \pi^- \omega K^+, D_s^+ \rightarrow \rho^+ \eta', \omega \rightarrow \pi^0 \gamma, \rho^+ \rightarrow \pi^0 \pi^+, \eta' \rightarrow \rho^0 \gamma,$ $\rho^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- K^+ \gamma \gamma \gamma)$	34	1	59
45	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow e^- \bar{\nu}_e D^{*+}, D^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^+ D^0, D^0 \rightarrow K^- a_1^+,$ $a_1^+ \rightarrow \rho^0 \pi^+, \rho^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- K^-)$	35	1	60
46	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \rho^0 \pi^+ \omega D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^0 \rightarrow \pi^+ \pi^-, \omega \rightarrow \pi^0 \pi^+ \pi^- \gamma^F \gamma^F, D^{*-} \rightarrow \pi^0 D^-,$ $D^0 \rightarrow \pi^0 \pi^0, D^- \rightarrow \mu^- \bar{\nu}_\mu K^0, K^0 \rightarrow K_L^0$ $(\Upsilon(4S) \rightarrow \mu^- \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^- \pi^- \gamma^F \gamma^F)$	36	1	61
47	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow K^0 J/\psi, \bar{B}^0 \rightarrow \pi^0 D^0, K^0 \rightarrow K_S^0, J/\psi \rightarrow \pi^0 \pi^- \rho^+ \eta, D^0 \rightarrow \pi^0 \pi^0,$ $K_S^0 \rightarrow \pi^0 \pi^0, \rho^+ \rightarrow \pi^0 \pi^+, \eta \rightarrow \pi^0 \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^-)$	37	1	62
48	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow e^- \bar{\nu}_e D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^0 D^+, D^+ \rightarrow \pi^+ \rho^+ K^-,$ $\rho^+ \rightarrow \pi^0 \pi^+$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ K^-)$	38	1	63
49	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow e^+ \nu_e D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^- \bar{D}^0, D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow \pi^0 \pi^+ \pi^- K^*,$ $K^* \rightarrow \pi^- K^+$ $(\Upsilon(4S) \rightarrow e^+ \nu_e \pi^0 \pi^0 \pi^0 \pi^+ \pi^- \pi^- \pi^- K^+)$	39	1	64

rowNo	decay tree (decay initial-final states)	iDcyTr	nEtr	nCEtr
50	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \mu^+ \nu_\mu D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^- \bar{D}^0, D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow e^- \bar{\nu}_e K^{*+} \gamma^F,$ $K^{*+} \rightarrow \pi^+ K^0, K^0 \rightarrow K_L^0$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \mu^+ \nu_\mu \pi^0 \pi^0 K_L^0 \pi^+ \pi^- \gamma^F)$	40	1	65
51	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow \pi^0 \rho^- \eta D^+, D^0 \rightarrow \pi^0 \pi^0, \rho^- \rightarrow \pi^0 \pi^-, \eta \rightarrow \pi^0 \pi^0 \pi^0,$ $D^+ \rightarrow \pi^0 \pi^+ \bar{K}^*, \bar{K}^* \rightarrow \pi^+ K^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^- K^-)$	41	1	66
52	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow e^- \bar{\nu}_e D_1^{'+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, D_1^{'+} \rightarrow \pi^0 D^{*+}, D^{*+} \rightarrow \pi^+ D^0,$ $D^0 \rightarrow \pi^0 \pi^+ K^-$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^- K^-)$	42	1	67
53	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow D^+ a_1^-, D^0 \rightarrow \pi^0 \pi^0, D^+ \rightarrow \mu^+ \nu_\mu \bar{K}^*, a_1^- \rightarrow \pi^+ \pi^- \pi^- \gamma^F,$ $\bar{K}^* \rightarrow \pi^0 \bar{K}^0, \bar{K}^0 \rightarrow K_L^0$ $(\Upsilon(4S) \rightarrow \mu^+ \nu_\mu \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^- \pi^- \gamma^F)$	43	1	68
54	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow K^0 D^{*+} D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, K^0 \rightarrow K_S^0, D^{*+} \rightarrow \pi^0 D^+, D^{*-} \rightarrow \pi^- \bar{D}^0,$ $D^0 \rightarrow \pi^0 \pi^0, K_S^0 \rightarrow \pi^+ \pi^-, D^+ \rightarrow \pi^+ \bar{K}_1'^0, \bar{D}^0 \rightarrow \rho^0 \rho^0, \bar{K}_1'^0 \rightarrow \pi^+ K^{*-}, \rho^0 \rightarrow \pi^+ \pi^-,$ $\rho^0 \rightarrow \pi^+ \pi^-, K^{*-} \rightarrow \pi^0 K^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- K^-)$	44	1	69
55	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^+ \pi^+ \pi^- D^-, \bar{B}^0 \rightarrow \pi^0 D^0, D^- \rightarrow \rho^0 \pi^- \gamma^F, D^0 \rightarrow \pi^0 \pi^0, \rho^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \pi^- \gamma^F)$	45	1	70
56	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \rho^0 \pi^+ D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^0 \rightarrow \pi^+ \pi^-, D^{*-} \rightarrow \pi^0 D^-, D^0 \rightarrow \pi^0 \pi^0,$ $D^- \rightarrow K_S^0 K^{*-}, K_S^0 \rightarrow \pi^0 \pi^0, K^{*-} \rightarrow \pi^- \bar{K}^0, \bar{K}^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \pi^-)$	46	1	71
57	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow \rho^- \omega \omega D^{*+}, \pi^0 \rightarrow e^+ e^- \gamma^F, D^0 \rightarrow \pi^0 \pi^0, \rho^- \rightarrow \pi^0 \pi^-,$ $\omega \rightarrow \pi^0 \pi^+ \pi^-, \omega \rightarrow \pi^0 \pi^+ \pi^-, \omega \rightarrow \pi^0 \pi^+ \pi^-, D^{*+} \rightarrow \pi^+ D^0, \pi^0 \rightarrow e^+ e^- \gamma^F, D^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow e^+ e^+ e^- e^- \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- \gamma^F \gamma^F)$	47	1	72
58	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^0 \pi^- D^+ \bar{D}^{*0}, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^+ \rightarrow \pi^+ \pi^+ K^-, \bar{D}^{*0} \rightarrow \bar{D}^0 \gamma,$ $\bar{D}^0 \rightarrow \pi^0 K^*, K^* \rightarrow \pi^0 K^0, K^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^0 \pi^0$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- K^- \gamma)$	48	1	73
59	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, B^0 \rightarrow \pi^0 \pi^0 \pi^- \rho^+ \rho^+ D^-, \bar{D}^0 \rightarrow \pi^0 \pi^0, \rho^+ \rightarrow \pi^0 \pi^+, \rho^+ \rightarrow \pi^0 \pi^+,$ $D^- \rightarrow \mu^- \bar{\nu}_\mu K^*, K^* \rightarrow \pi^- K^+$ $(\Upsilon(4S) \rightarrow \mu^- \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- K^+)$	49	1	74
60	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow K^+ \bar{p} \Xi_c'^0, \bar{D}^0 \rightarrow \pi^0 \pi^0, \Xi_c'^0 \rightarrow \Xi_c^0 \gamma, \Xi_c^0 \rightarrow K^+ \Omega^-,$ $\Omega^- \rightarrow \pi^0 \Xi^-, \Xi^- \rightarrow \pi^- \Lambda, \Lambda \rightarrow \pi^- p$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^- \pi^- K^+ K^+ p \bar{p} \gamma)$	50	1	75
61	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow e^- \bar{\nu}_e \pi^+ D^{*0}, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*0} \rightarrow \pi^0 D^0, D^0 \rightarrow \pi^0 \pi^+ K^- \gamma^F$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ K^- \gamma^F)$	51	1	76

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62	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow D^{*+} a_1^-, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^0 D^+, a_1^- \rightarrow \pi^0 \rho^-,$ $D^+ \rightarrow \pi^0 \pi^+ \phi, \rho^- \rightarrow \pi^0 \pi^-, \phi \rightarrow K^+ K^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^- K^+ K^-)$	52	1	77
63	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \bar{K}^0 \psi', \bar{D}^0 \rightarrow \pi^0 \pi^0, \bar{K}^0 \rightarrow K_L^0, \psi' \rightarrow \chi_{c2} \gamma,$ $\chi_{c2} \rightarrow \pi^0 \rho^- \eta \bar{K}^0 K^+, \rho^- \rightarrow \pi^0 \pi^- \gamma^F, \eta \rightarrow \pi^0 \pi^+ \pi^-, \bar{K}^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^- \pi^- K^+ \gamma^F \gamma)$	53	1	78
64	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 K^{*+} D^{*-} D^{*0}, \bar{B}^0 \rightarrow \pi^0 D^0, K^{*+} \rightarrow \pi^0 K^+, D^{*-} \rightarrow \pi^- \bar{D}^0, D^{*0} \rightarrow \pi^0 \bar{D}^0,$ $D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow \omega K_S^0, D^0 \rightarrow \mu^+ \nu_\mu K^- \gamma^F, \omega \rightarrow \pi^0 \pi^+ \pi^-, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \mu^+ \nu_\mu \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \pi^- K^+ K^- \gamma^F)$	54	1	79
65	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow \pi^0 \pi^+ K^+ K^- D_s^-, D^0 \rightarrow \pi^0 \pi^0, D_s^- \rightarrow \rho^- \eta, \rho^- \rightarrow \pi^0 \pi^-,$ $\eta \rightarrow \pi^0 \pi^0 \pi^0$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^- K^+ K^-)$	55	1	80
66	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \tau^- \bar{\nu}_\tau D^+, \bar{D}^0 \rightarrow \pi^0 \pi^0, \tau^- \rightarrow \nu_\tau \pi^0 \pi^-, D^+ \rightarrow \pi^+ \phi,$ $\phi \rightarrow K_L^0 K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \nu_\tau \bar{\nu}_\tau \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^- \pi^-)$	56	1	81
67	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow D^- a_1^+, \bar{B}^0 \rightarrow \pi^0 D^0, D^- \rightarrow e^- \bar{\nu}_e \pi^- K^+ \gamma^F, a_1^+ \rightarrow \rho^0 \pi^+, D^0 \rightarrow \pi^0 \pi^0,$ $\rho^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- K^+ \gamma^F)$	57	1	82
68	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \rho^- \eta K^0 \bar{K}^* D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \rho^- \rightarrow \pi^0 \pi^-, \eta \rightarrow \pi^0 \pi^0 \pi^0,$ $K^0 \rightarrow K_L^0, \bar{K}^* \rightarrow \pi^+ K^-, D^{*+} \rightarrow \pi^+ D^0, K_L^0 \rightarrow \pi^0 \pi^0 \pi^0, D^0 \rightarrow \mu^+ \nu_\mu K^- \gamma^F$ $(\Upsilon(4S) \rightarrow \mu^+ \nu_\mu \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- K^- K^- \gamma^F)$	58	1	83
69	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \mu^- \bar{\nu}_\mu D^+, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^+ \rightarrow \pi^0 \pi^+ \bar{K}^*, \bar{K}^* \rightarrow \pi^+ K^-$ $(\Upsilon(4S) \rightarrow \mu^- \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ K^-)$	59	1	84
70	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \pi^+ \pi^- \pi^- \rho^+ K^+ K^-, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^+ \rightarrow \pi^0 \pi^+, D^0 \rightarrow \pi^0 \pi^0$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- K^+ K^-)$	60	1	85
71	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow D^- \bar{n} p, \bar{B}^0 \rightarrow \pi^0 D^0, D^- \rightarrow e^- \bar{\nu}_e \pi^- K^+, D^0 \rightarrow \pi^0 \pi^0$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^- K^+ \bar{n} p)$	61	1	86
72	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^- D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^+ D^0, D^0 \rightarrow \pi^0 \pi^+ \pi^- K_S^0,$ $K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^-)$	62	1	87
73	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow \eta \bar{K}^0 D^{*0} \bar{D}^{*0}, D^0 \rightarrow \pi^0 \pi^0, \eta \rightarrow \pi^0 \pi^+ \pi^-, \bar{K}^0 \rightarrow K_S^0,$ $D^{*0} \rightarrow D^0 \gamma, \bar{D}^{*0} \rightarrow \pi^0 \bar{D}^0, K_S^0 \rightarrow \pi^+ \pi^-, D^0 \rightarrow \pi^0 \pi^+ \pi^- K_S^0, \bar{D}^0 \rightarrow \pi^0 \pi^- K^+, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- K^+ \gamma)$	63	1	88
74	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^+ \pi^- K^- D^{*+} n \bar{\Delta}^0, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^{*+} \rightarrow \pi^+ D^0, \bar{\Delta}^0 \rightarrow \pi^+ \bar{p},$ $D^0 \rightarrow \pi^0 \pi^0 \pi^0 \pi^+ \pi^-, \pi^0 \rightarrow e^+ e^- \gamma^F$ $(\Upsilon(4S) \rightarrow e^+ e^- \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- K^- n \bar{p} \gamma^F)$	64	1	89

rowNo	decay tree (decay initial-final states)	iDcyTr	nEtr	nCEtr
75	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \mu^+ \nu_\mu D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^0 D^-, D^0 \rightarrow \pi^0 \pi^0, D^- \rightarrow \pi^0 \pi^0 \pi^-$ ($\Upsilon(4S) \rightarrow \mu^+ \nu_\mu \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^-$)	65	1	90
76	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^0 \rho^0 \pi^- \eta \eta D^+, \bar{D}^0 \rightarrow \pi^0 \pi^0, \rho^0 \rightarrow \pi^+ \pi^- \gamma^F, \eta \rightarrow \pi^0 \pi^0 \pi^0,$ $\eta \rightarrow \pi^0 \pi^+ \pi^-, D^+ \rightarrow K_L^0 K^{*+}, K^{*+} \rightarrow \pi^+ K^0, K^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^0 \pi^0$ ($\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \gamma^F$)	66	1	91
77	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow K^+ \Sigma^0 \Xi_c'^-, \bar{B}^0 \rightarrow \pi^0 D^0, \Sigma^0 \rightarrow \Lambda \gamma, \Xi_c'^- \rightarrow \pi^- \pi^- K^+ \bar{\Lambda} \gamma^F, D^0 \rightarrow \pi^0 \pi^0,$ $\Lambda \rightarrow \pi^- p, \bar{\Lambda} \rightarrow \pi^+ \bar{p}$ ($\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^+ \pi^- \pi^- \pi^- K^+ K^+ p \bar{p} \gamma^F \gamma$)	67	1	92
78	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow \bar{K}^* D^+ D^-, D^0 \rightarrow \pi^0 \pi^0, \bar{K}^* \rightarrow \pi^+ K^-, D^+ \rightarrow \rho^+ \bar{K}^*,$ $D^- \rightarrow \mu^- \bar{\nu}_\mu K^0, \rho^+ \rightarrow \pi^0 \pi^+, \bar{K}^* \rightarrow \pi^0 \bar{K}^0, K^0 \rightarrow K_S^0, \bar{K}^0 \rightarrow K_L^0, K_S^0 \rightarrow \pi^+ \pi^-$ ($\Upsilon(4S) \rightarrow \mu^- \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^- K^-$)	68	1	93
79	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^- \omega D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \omega \rightarrow \pi^0 \pi^+ \pi^-, D^{*+} \rightarrow \pi^+ D^0,$ $D^0 \rightarrow \mu^+ \nu_\mu K^{*-}, K^{*-} \rightarrow \pi^0 K^-$ ($\Upsilon(4S) \rightarrow \mu^+ \nu_\mu \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- K^-$)	69	1	94
80	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow K^* D^{*0} \bar{D}^{*0}, \bar{B}^0 \rightarrow \pi^0 D^0, K^* \rightarrow \pi^- K^+, D^{*0} \rightarrow D^0 \gamma, \bar{D}^{*0} \rightarrow \pi^0 \bar{D}^0,$ $D^0 \rightarrow \pi^0 \pi^0, D^0 \rightarrow K^- a_1^+, \bar{D}^0 \rightarrow e^- \bar{\nu}_e \pi^+ K^0 \gamma^F, a_1^+ \rightarrow \pi^+ f_0(600), K^0 \rightarrow K_L^0, K_L^0 \rightarrow e^- \nu_e \pi^+ \gamma^F$ ($\Upsilon(4S) \rightarrow e^- e^- \nu_e \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- K^+ K^- f_0(600) \gamma^F \gamma^F \gamma$)	70	1	95
81	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow D^+ D_s^{*-}, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^+ \rightarrow e^+ \nu_e \pi^+ K^- \gamma^F, D_s^{*-} \rightarrow D_s^- \gamma,$ $D_s^- \rightarrow \rho^- \eta, \rho^- \rightarrow \pi^0 \pi^-, \eta \rightarrow \gamma \gamma$ ($\Upsilon(4S) \rightarrow e^+ \nu_e \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^- K^- \gamma^F \gamma \gamma$)	71	1	96
82	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow K^* \eta_c, \bar{B}^0 \rightarrow \pi^0 D^0, K^* \rightarrow \pi^0 K_L^0, \eta_c \rightarrow \pi^0 K^0 \bar{K}^0, D^0 \rightarrow \pi^0 \pi^0,$ $K^0 \rightarrow K_L^0, \bar{K}^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^- \gamma^F$ ($\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 K_L^0 \pi^+ \pi^- \gamma^F$)	1	1	97
83	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow e^- \bar{\nu}_e D_2^{*+} \gamma^F \gamma^F, \bar{D}^0 \rightarrow \pi^0 \pi^0, D_2^{*+} \rightarrow \pi^+ D^{*0}, D^{*0} \rightarrow \pi^0 D^0,$ $D^0 \rightarrow K^- K^{*+}, K^{*+} \rightarrow \pi^+ K^0, K^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ ($\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- K^- \gamma^F \gamma^F$)	73	1	98
84	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow e^+ \nu_e D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^0 D^-, D^0 \rightarrow \pi^0 \pi^0, D^- \rightarrow \pi^- \pi^- K^+$ ($\Upsilon(4S) \rightarrow e^+ \nu_e \pi^0 \pi^0 \pi^0 \pi^0 \pi^- \pi^- K^+$)	74	1	99
85	$\Upsilon(4S) \rightarrow B^0 B^0, B^0 \rightarrow \pi^0 \bar{D}^0, B^0 \rightarrow \pi^+ \omega D^{*-}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \omega \rightarrow \pi^0 \pi^+ \pi^-, D^{*-} \rightarrow \pi^- \bar{D}^0,$ $\bar{D}^0 \rightarrow \pi^+ \pi^- \gamma^F$ ($\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \pi^- \gamma^F$)	75	1	100
86	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \pi^0 \pi^- \pi^- \bar{K}^0 K^{*+} D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \bar{K}^0 \rightarrow K_S^0, K^{*+} \rightarrow \pi^+ K^0,$ $D^{*+} \rightarrow \pi^+ D^0, K_S^0 \rightarrow \pi^+ \pi^-, K^0 \rightarrow K_L^0, D^0 \rightarrow K_L^0 \pi^+ \pi^-$ ($\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 K_L^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^-$)	76	1	101
87	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \rho^0 \bar{K}^0 K^+ \eta' D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^0 \rightarrow \pi^+ \pi^-, \bar{K}^0 \rightarrow K_L^0, \eta' \rightarrow \rho^0 \gamma,$ $D^{*-} \rightarrow \pi^0 D^-, D^0 \rightarrow \pi^0 \pi^0, \rho^0 \rightarrow \pi^+ \pi^- \gamma^F, D^- \rightarrow \pi^0 \pi^- K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ ($\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- K^+ \gamma^F \gamma$)	77	1	102

rowNo	decay tree (decay initial-final states)	iDcyTr	nEtr	nCEtr
88	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \rho^0 \rho^0 \pi^+ \pi^- \omega \bar{D}^{*0}, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^0 \rightarrow \pi^+ \pi^-, \rho^0 \rightarrow \pi^+ \pi^-, \omega \rightarrow \pi^0 \pi^+ \pi^-,$ $\bar{D}^{*0} \rightarrow \bar{D}^0 \gamma, D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow \rho^0 K^*, \rho^0 \rightarrow \pi^+ \pi^-, K^* \rightarrow \pi^- K^+$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- \pi^- K^+ \gamma)$	2	1	103
89	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^+ \rho^+ \rho^- D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^+ \rightarrow \pi^0 \pi^+, \rho^- \rightarrow \pi^0 \pi^-, D^{*-} \rightarrow \pi^- \bar{D}^0,$ $D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow \pi^- K_1^+, K_1^+ \rightarrow \pi^+ K^*, K^* \rightarrow \pi^- K^+$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^- K^+)$	79	1	104
90	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow K^+ D^{*-} D^{*0} \gamma^F, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^- \bar{D}^0, D^{*0} \rightarrow \pi^0 D^0, D^0 \rightarrow \pi^0 \pi^0,$ $\bar{D}^0 \rightarrow \pi^0 K_L^0, D^0 \rightarrow e^+ \nu_e K^-$ $(\Upsilon(4S) \rightarrow e^+ \nu_e \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^- K^+ K^- \gamma^F)$	80	1	105
91	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^- \bar{D}^{*0} D_s^+, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{D}^{*0} \rightarrow \bar{D}^0 \gamma, D_s^+ \rightarrow \pi^+ \eta, D^0 \rightarrow \pi^0 \pi^0,$ $\bar{D}^0 \rightarrow e^- \bar{\nu}_e K^{*+} \gamma^F, \eta \rightarrow \pi^0 \pi^0 \pi^0, K^{*+} \rightarrow \pi^+ K^0, K^0 \rightarrow K_L^0$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^- \gamma^F \gamma)$	81	1	106
92	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \pi^0 \pi^+ \pi^+ \rho^- \omega D^{*-}, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^- \rightarrow \pi^0 \pi^-, \omega \rightarrow \pi^0 \pi^+ \pi^-, D^{*-} \rightarrow \pi^- \bar{D}^0,$ $D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow K^+ K^-, \pi^0 \rightarrow e^+ e^- \gamma^F$ $(\Upsilon(4S) \rightarrow e^+ e^- \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \pi^- K^+ K^- \gamma^F)$	82	1	107
93	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \rho^0 \rho^+ D^-, \bar{B}^0 \rightarrow \pi^0 D^0, \rho^0 \rightarrow \pi^+ \pi^-, \rho^+ \rightarrow \pi^0 \pi^+, D^- \rightarrow e^- \bar{\nu}_e K^0 \gamma^F \gamma^F,$ $D^0 \rightarrow \pi^0 \pi^0, K^0 \rightarrow K_L^0$ $(\Upsilon(4S) \rightarrow e^- \bar{\nu}_e \pi^0 \pi^0 \pi^0 \pi^0 K_L^0 \pi^+ \pi^+ \pi^- \gamma^F \gamma^F)$	83	1	108
94	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \tau^- \bar{\nu}_\tau D^{*+}, \bar{D}^0 \rightarrow \pi^0 \pi^0, \tau^- \rightarrow \nu_\tau \pi^0 \pi^0 \pi^-, D^{*+} \rightarrow \pi^+ D^0,$ $D^0 \rightarrow \pi^0 \pi^0 K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow \nu_\tau \bar{\nu}_\tau \pi^0 \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^-)$	84	1	109
95	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow K^- D^+ \bar{D}^{*0}, \bar{D}^0 \rightarrow \pi^0 \pi^0, D^+ \rightarrow \pi^+ \pi^+ K^- \gamma^F, \bar{D}^{*0} \rightarrow \pi^0 \bar{D}^0,$ $\bar{D}^0 \rightarrow \pi^0 \pi^- K^+$ $(\Upsilon(4S) \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- K^+ K^- K^- \gamma^F)$	85	1	110
96	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \pi^0 \bar{D}^0, \bar{B}^0 \rightarrow \mu^- \bar{\nu}_\mu D_0^{*+} \gamma^F, \bar{D}^0 \rightarrow \pi^0 \pi^0, D_0^{*+} \rightarrow \pi^+ D^0, D^0 \rightarrow \pi^0 K_L^0,$ $K_L^0 \rightarrow \mu^- \nu_\mu \pi^+$ $(\Upsilon(4S) \rightarrow \mu^- \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \gamma^F)$	86	1	111
97	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow e^+ \nu_e D^{*-} \gamma^F, \bar{B}^0 \rightarrow \pi^0 D^0, D^{*-} \rightarrow \pi^- \bar{D}^0, D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow \pi^0 \pi^+ \pi^- K^*,$ $K^* \rightarrow \pi^0 K^0, K^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^-$ $(\Upsilon(4S) \rightarrow e^+ \nu_e \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \gamma^F)$	87	1	112
98	$\Upsilon(4S) \rightarrow \bar{B}^0 \bar{B}^0, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{B}^0 \rightarrow \mu^- \bar{\nu}_\mu D^+ \gamma^F, D^0 \rightarrow \pi^0 \pi^0, D^+ \rightarrow K_L^0 \pi^+ \gamma^F$ $(\Upsilon(4S) \rightarrow \mu^- \bar{\nu}_\mu \pi^0 \pi^0 K_L^0 \pi^+ \gamma^F \gamma^F)$	88	1	113
99	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow e^+ \nu_e D^-, \bar{B}^0 \rightarrow \pi^0 D^0, D^- \rightarrow K_S^0 K^{*-}, D^0 \rightarrow \pi^0 \pi^0, K_S^0 \rightarrow \pi^+ \pi^-,$ $K^{*-} \rightarrow \pi^- \bar{K}^0, \bar{K}^0 \rightarrow K_L^0$ $(\Upsilon(4S) \rightarrow e^+ \nu_e \pi^0 \pi^0 K_L^0 \pi^+ \pi^- \pi^-)$	89	1	114

rowNo	decay tree (decay initial-final states)	iDcyTr	nEtr	nCEtr
100	$\Upsilon(4S) \rightarrow B^0 \bar{B}^0, B^0 \rightarrow \mu^+ \nu_\mu \pi^- \bar{D}^{*0}, \bar{B}^0 \rightarrow \pi^0 D^0, \bar{D}^{*0} \rightarrow \pi^0 \bar{D}^0, D^0 \rightarrow \pi^0 \pi^0, \bar{D}^0 \rightarrow \mu^- \bar{\nu}_\mu K^{*+},$ $K^{*+} \rightarrow \pi^+ K^0, K^0 \rightarrow K_S^0, K_S^0 \rightarrow \pi^+ \pi^- \gamma^F$ $(\Upsilon(4S) \dashrightarrow \mu^+ \mu^- \nu_\mu \bar{\nu}_\mu \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \gamma^F)$	90	1	115
rest	$\Upsilon(4S) \rightarrow \text{others (885 in total)}$ $(\Upsilon(4S) \dashrightarrow \text{corresponding to others})$	—	885	1000