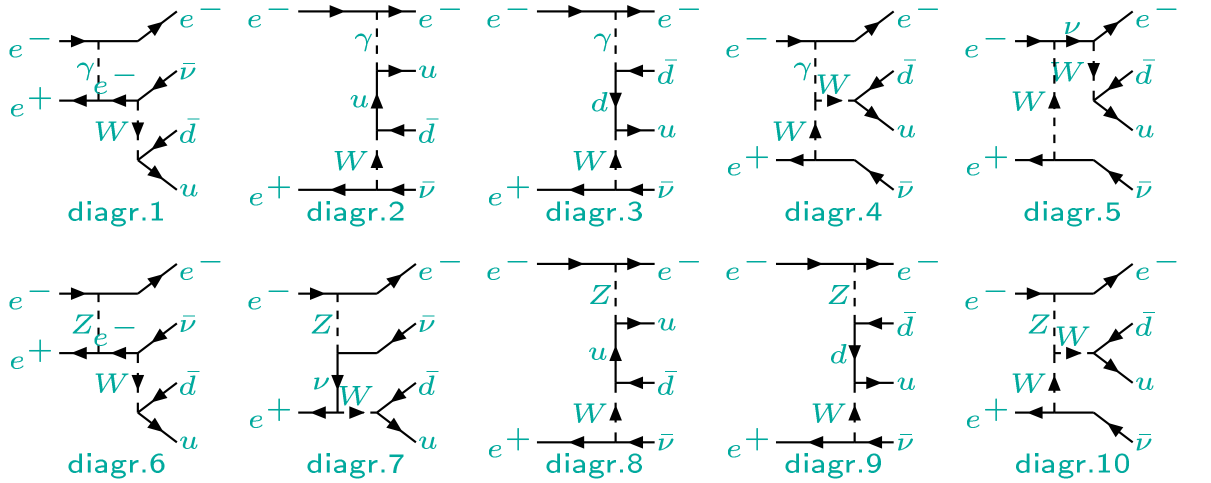
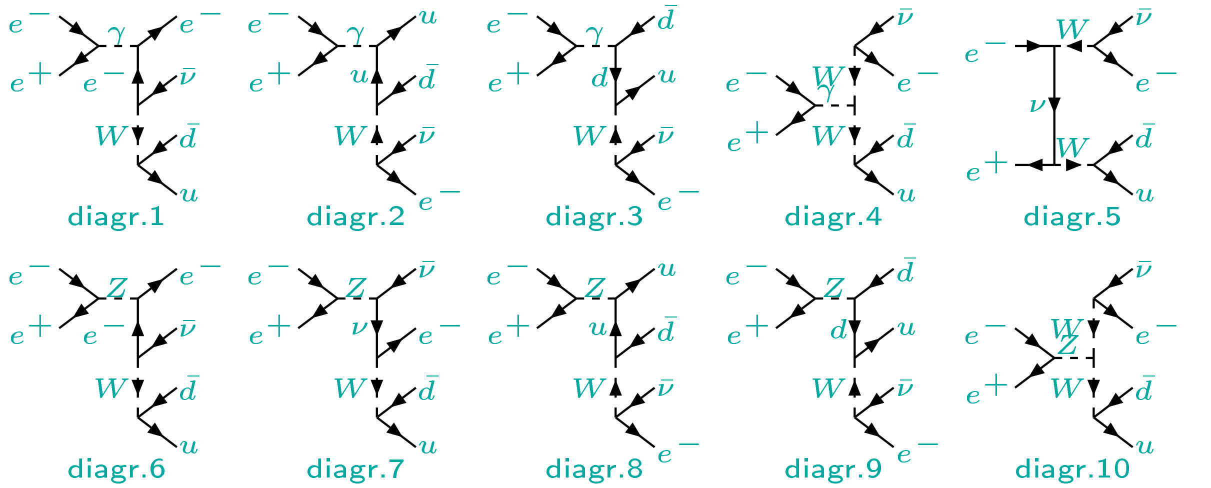
The CC20 process $e^+e^- \to e^-\bar{\nu}_e u\bar{d}$ contains two exact minimal gauge invariant classes ("groves") of diagrams: CC10 t-channel and CC10 s-channel

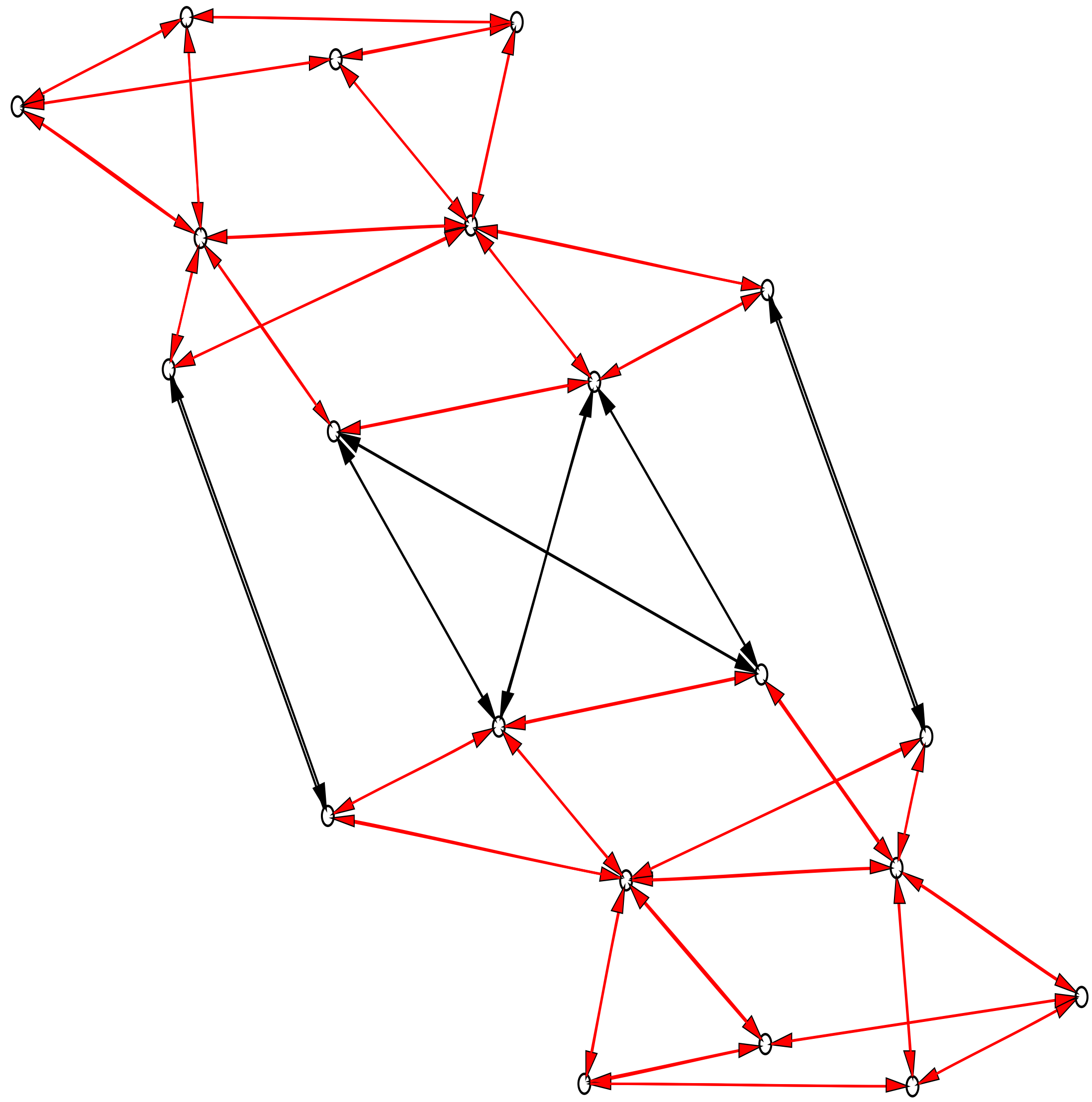
CC10 t-channel



CC10 s-channel



The Forest for the CC20 process contains two CC10 Groves (t- and s- channel)



a

Red lines - gauge flips
Black lines - flavour flips

[a] T. Ohl, Objective Caml program *bocages* (1999, unpublished)

Contributions to the total cross section (in fb) for the CC20 process at LEPII and LC energies

$\sqrt{s}$	$\sigma(CC10-t)$	$\sigma(CC10-s)$	$\sigma(t-s\ interf.)$	σ_{tot}
quark phase space cuts, no ISR				
183	130(0)	655(1)	0.2(0)	785(1)
190	147(0)	680(1)	5(0)	832(1)
350	635(1)	420(1)	21(0)	1076(1)
500	1127(2)	270(0)	19(0)	1417(2)
800	1981(4)	143(0)	16(0)	2140(4)
quark phase space cuts, with ISR				
183	117(0)	566(1)	0.2(0)	683(1)
190	132(0)	603(1)	5(0)	739(1)
350	587(1)	432(1)	20(0)	1039(1)
500	1049(5)	289(0)	19(0)	1357(5)
850	1873(4)	159(0)	16(1)	2048(4)
lepton and quark phase space cuts, no ISR				
183	102(0)	2(0)	0.0(0)	104(0)
190	116(0)	2(0)	0.0(0)	118(0)
350	513(1)	7(0)	0.2(0)	520(1)
500	928(2)	10(0)	0.3(0)	938(2)
800	1671(4)	15(0)	0.4(0)	1686(4)
lepton and quark phase space cuts, with ISR				
183	92(1)	2(0)	0.0(0)	94(1)
190	103(1)	2(0)	0.0(0)	105(1)
350	472(1)	6(0)	0.0(0)	478(1)
500	854(9)	10(0)	0.3(0)	864(9)
800	1581(3)	15(0)	0.4(0)	1596(3)

quark phase space cuts: $E_q \geq 3$ GeV, $M_{ud} \geq 5$ GeV
lepton phase space cut: $\cos\theta_e \geq 0.997$