Table 3: Results of the tests performed using several samples of Monte Carlo and data events for some significant parameters. The meaning of the labels in the first column are explained in the text. The first line shows the true values computed from the Monte Carlo truth tables. Lines (a) to (i) refer to fits performed on pure signal events, (j) is the result obtained when considering also the B^- peaking background, (k) the results when also the $B\overline{B}$ combinatorial background is added and (l) the result obtained using the $B\overline{B}$ combinatorial background parameter values determined from a fit to the corresponding Δt distribution in the signal region. In the last line we report also the result obtained in the real data (see chapter 6), for which, however, the values of Δm_d and τ_{B^0} are blind.

Sample	τ_{B^0} (ps)	$\Delta m_d (\mathrm{ps})^{-1}$	χ_d	$D_{\mathcal{P}\ell}(\mathcal{C}\ell)$	f_{bcl}	τ_{D_e}
truth	1.548	0.472	0.174			
(a)	1.565 ± .005	0.475 ± .001	0.178 ± .001	-	-	-
(b)	1.571 ± .005	0.468 ± .001	0.176 ± .001	-	-	-
(c)	1.571 ± .005	0.469 ± .002	0.176 ± .001	0.975 ± .001	-	-
(d)	1.561 ± .005	0.475 ± .002	0.177 ± .001	-	-	-
(e)	1.562 ± .007	0.470 ± .003	0.175 ± .001	0.972 ± .002	-	-
(f)	1.608 ± .022	0.412 ± .012	0.153 ± .007	0.526 ± .013	-	-
(g)	1.561 ± .006	0.476 ± .003	0.177 ± .002	0.968 ± .002	0.073 ± .002	-
(h)	-	-	-	-	-	0.36 ± .01
(i)	1.565 ± .006	0.474 ± .002	0.177 ± .001	0.971 ± .005	0.075 ± .003	0.35 ± .02
(j)	1.561 ± .005	0.473 ± .002	0.176 ± .001	0.971 ± .002	0.075 ± .002	0.37 ± .03
(k)	1.575 ± .006	0.469 ± .002	0.177 ± .001	0.969 ± .002	0.077 ± .002	0.22 ± .01
(l)	1.576 ± .004	0.469 ± .002	0.177 ± .001	0.969 ± .001	0.077 ± .001	0.22 ± .01
(m)	1.575 ± .004	0.470 ± .002	0.177 ± .001	0.969 ± .002	0.077 ± .001	0.23 ± .01
Data	±	±	±	±	±	±

4.3 Fit to B^- peaking background

We describe the B^- peaking background with the functions described in section 3.1.5. We first fit this Monte Carlo sample alone, see table 4 and figure 13. We then add this sample to the $\overline{B}^0$ peaking signal and we perform the fit again. The result for Δm_d and τ_{B^0} is reported in line (j) of table 3, the full result can be found again in table 15. The comparison between the Monte Carlo data and the fit function is displayed instead on figure 14.

Table 4: Results of the fit to the B^- peaking events.

$b_N = b_W$	S_N	S_W	S_O	f_W	f_O	τ_{D_e}	$b_N(= b_W)(\mathcal{D}\ell)$
0.01±.03	0.99±0.05	2.7±0.5	16±17	0.05±0.02	0.002±0.003	0.87±.14	-0.09±.02

4.4 Fit to $B\overline{B}$ combinatorial background

As mentioned above, we determine the parameters of the background PDF in the data using also the events in the $\mathcal{M}_\nu{}^2$ background region (see section 3.1.6), which does not contain signal events. Therefore we need to prove that the parameters of the PDF do not depend on $\mathcal{M}_\nu{}^2$. We perform two validations. First, we fit the background proper time difference with the functions described in

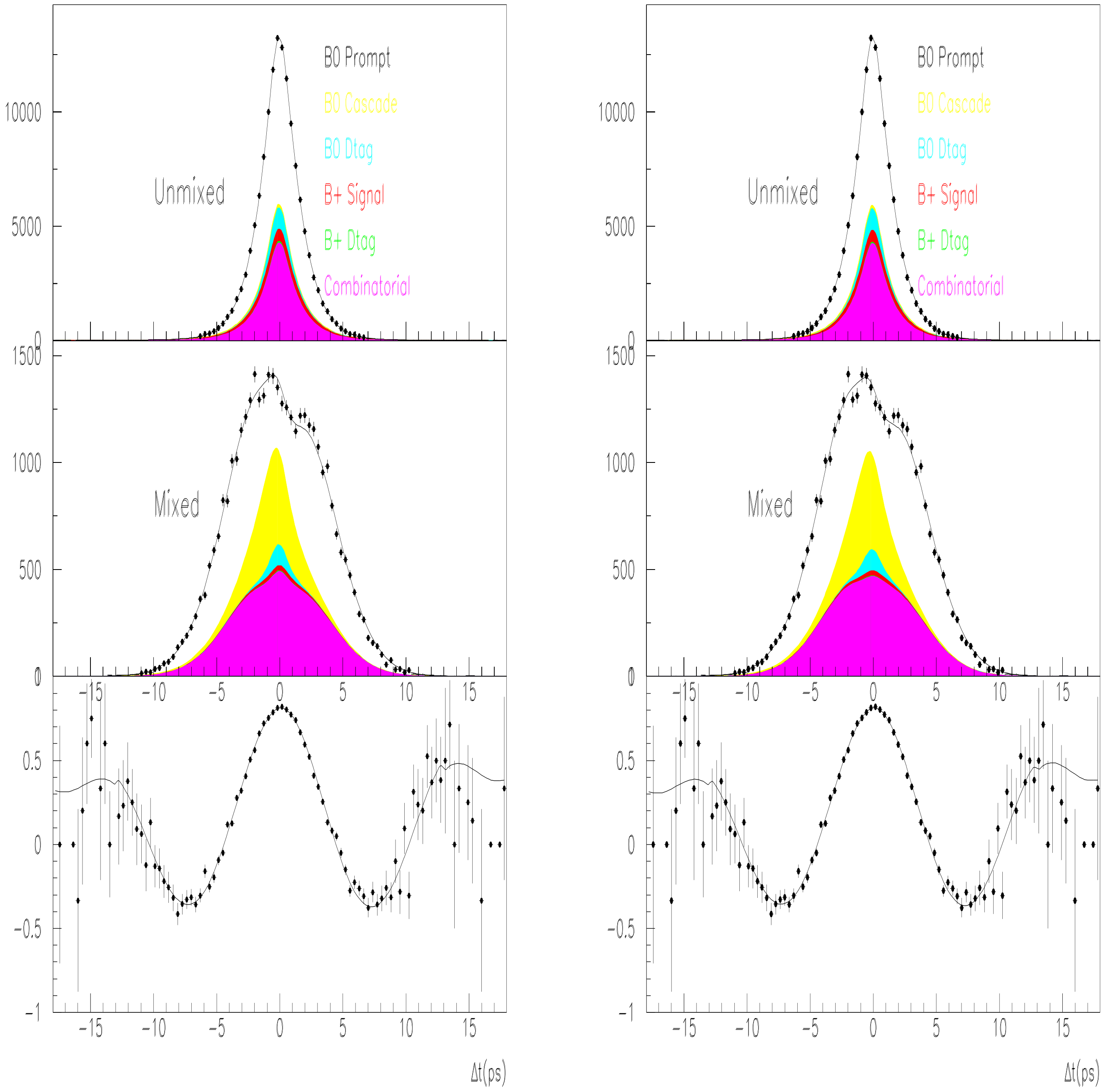

Figure 18:
Fit to Δt for the $\overline{B}^0$ signal region sample with the $B\overline{B}$ combinatorial background parameters fixed to the result of the combinatorial background fit in the background region (left) and signal region (right) ((m) and (l) in the text).

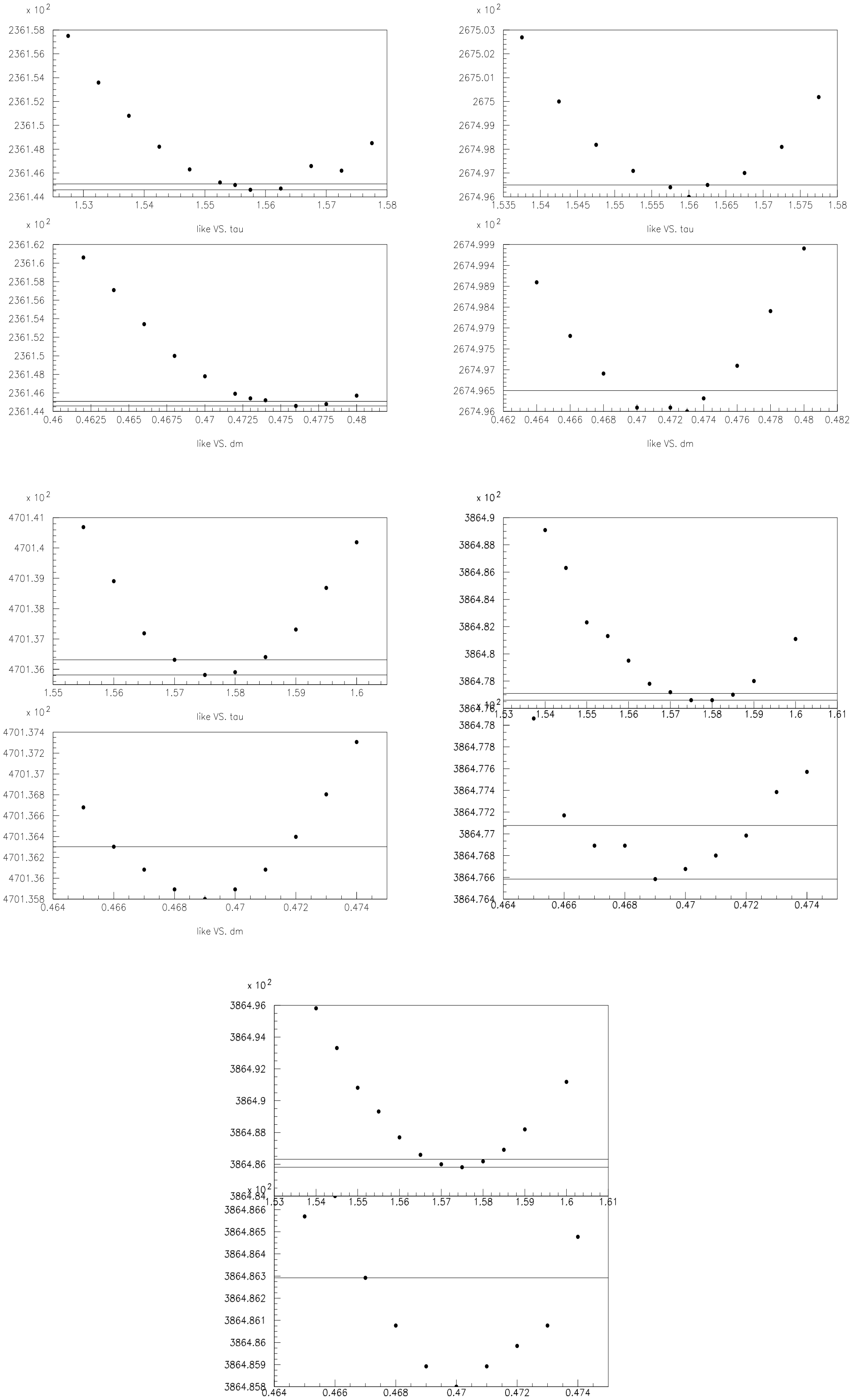

Figure 19:
Minimum log-likelihood obtained with the scan versus τ_{B^0} and Δm_d . Pure signal Monte Carlo $\mathcal{P}\ell$ plus $\mathcal{D}\ell$ sample (upper left), $\overline{B}^0$ plus B^- resonant sample (upper right), global Monte Carlo fit (middle left), test (l) of table 3 (middle right) and test (m) of table 3 (lower)