

## 1 Nominal correlations.

Measurements		CVW/%	IIW/%	MIW/%	RI/%	bJES
ALJ10	$169.30 \pm 2.50$	-27.78	3.10	18.48	8.36	2.50
ALJ11	$174.50 \pm 1.60$	11.04	7.56	1.20	3.32	1.60
AJT11	$174.90 \pm 1.40$	37.32	9.88	10.45	11.23	1.40
CLL10	$175.50 \pm 0.90$	-6.11	23.90	0.10	1.84	0.90
CLJ10	$173.10 \pm 0.90$	-6.11	23.90	0.10	1.84	0.90
CLL11	$173.30 \pm 1.10$	-76.11	16.00	24.00	22.91	1.10
CMJ11	$172.60 \pm 0.70$	167.76	39.51	47.21	50.49	0.70
Correlations	—	—	-23.86	—	—	—
BLUE <sub>mt</sub>	$173.84 \pm 0.44$	100.00	100.00	101.55	100.00	0.44

Table 1: BLUE of the combination ( $\chi^2/\text{ndof} = 219.60/6$ ). For each input measurement  $i$  the following are listed: the central value weight  $\text{CVW}_i$  or  $\lambda_i$ , the intrinsic information weight  $\text{IIW}_i$ , the marginal information weight  $\text{MIW}_i$ , the relative importance  $\text{RI}_i$ . The intrinsic information weight  $\text{IIW}_{\text{corr}}$  of correlations is also shown on a separate row.

OffDiag & ErrSrc	bJES	OffDiag
ALJ11 / ALJ10	1.204	1.204
AJT11 / ALJ10	3.561	3.561
AJT11 / ALJ11	-0.906	-0.906
CLL10 / ALJ10	-0.187	-0.187
CLL10 / ALJ11	0.048	0.048
CLL10 / AJT11	0.141	0.141
CLJ10 / ALJ10	-0.187	-0.187
CLJ10 / ALJ11	0.048	0.048
CLJ10 / AJT11	0.141	0.141
CLJ10 / CLL10	-0.030	-0.030
CLL11 / ALJ10	-2.853	-2.853
CLL11 / ALJ11	0.726	0.726
CLL11 / AJT11	2.146	2.146
CLL11 / CLL10	-0.452	-0.452
CLL11 / CLJ10	-0.452	-0.452
CMJ11 / ALJ10	4.002	4.002
CMJ11 / ALJ11	-1.018	-1.018
CMJ11 / AJT11	-3.010	-3.010
CMJ11 / CLL10	0.634	0.634
CMJ11 / CLJ10	0.634	0.634
CMJ11 / CLL11	9.648	9.648
ErrSrc	13.837	GlobFact 13.837

Table 2: Normalised Fisher information derivatives  $1/I \cdot dI/dX$  for the combination under consideration. The derivatives in the table are computed with respect to scale factors  $X$ , representing the ratio of a given correlation to its "current" value in the combination under consideration, and all normalized by the information  $I$  for the "current" values of correlations. They are computed for the "current" values of correlations (in this case: nominal correlations). Color boxes indicate normalised derivatives greater than 0.05 (yellow), 0.10 (orange) and 0.15 (red). The last column and last row list information derivatives when the same rescaling factor is used for a given off-diagonal element or error source, which are equal to the sums of individual derivatives in each row and column, respectively.

	ALJ10	ALJ11	AJT11	CLL10	CLJ10	CLL11	CMJ11
ALJ10	6.25	3.80	3.32	1.07	1.07	1.31	0.83
ALJ11	3.80	2.56	2.13	0.68	0.68	0.84	0.53
AJT11	3.32	2.13	1.96	0.60	0.60	0.73	0.47
CLL10	1.07	0.68	0.60	0.81	0.77	0.94	0.60
CLJ10	1.07	0.68	0.60	0.77	0.81	0.94	0.60
CLL11	1.31	0.84	0.73	0.94	0.94	1.21	0.73
CMJ11	0.83	0.53	0.47	0.60	0.60	0.73	0.49

Table 3: Full input covariance between measurements (summed over error sources).

$$\begin{pmatrix} & \text{ALJ10} & \text{ALJ11} & \text{AJT11} & \text{CLL10} & \text{CLJ10} & \text{CLL11} & \text{CMJ11} \\ \text{ALJ10} & 6.25 & 3.80 & 3.32 & 1.07 & 1.07 & 1.31 & 0.83 \\ \text{ALJ11} & 3.80 & 2.56 & 2.13 & 0.68 & 0.68 & 0.84 & 0.53 \\ \text{AJT11} & 3.32 & 2.13 & 1.96 & 0.60 & 0.60 & 0.73 & 0.47 \\ \text{CLL10} & 1.07 & 0.68 & 0.60 & 0.81 & 0.77 & 0.94 & 0.60 \\ \text{CLJ10} & 1.07 & 0.68 & 0.60 & 0.77 & 0.81 & 0.94 & 0.60 \\ \text{CLL11} & 1.31 & 0.84 & 0.73 & 0.94 & 0.94 & 1.21 & 0.73 \\ \text{CMJ11} & 0.83 & 0.53 & 0.47 & 0.60 & 0.60 & 0.73 & 0.49 \end{pmatrix}$$

Table 4: Partial input covariance between measurements. Error source #0: bJES.

## 2 Modified correlations.

### 2.1 Summary of results.

Combination	BLUE	bJES	$\chi^2/\text{ndof}$
Nominal correlations	$173.84 \pm 0.44$	0.44	219.60/6
Minimize by global factor	$173.66 \pm 0.66$	0.66	33.54/6
Minimize by error sources	$173.66 \pm 0.66$	0.66	33.54/6
Minimize by off-diagonal elements	$172.64 \pm 0.70$	0.70	87.90/6
Remove negative CVWs	$172.64 \pm 0.70$	0.70	3.48/1
Onionize	$172.66 \pm 0.70$	0.70	94.69/6
NO correlations	$173.56 \pm 0.40$	0.40	11.01/6

Table 5: Summary table. BLUE's of the combinations performed with nominal and modified correlations.

## 2.2 Minimize correlations by a global rescaling factor.

Measurements		CVW/%	IIW/%	MIW/%	RI/%	bJES
ALJ10	$169.30 \pm 2.50$	-8.83	6.92	5.10	6.12	2.50
ALJ11	$174.50 \pm 1.60$	4.75	16.89	0.60	3.29	1.60
AJT11	$174.90 \pm 1.40$	13.84	22.06	3.93	9.59	1.40
CLL10	$175.50 \pm 0.90$	13.31	53.37	1.39	9.23	0.90
CLJ10	$173.10 \pm 0.90$	13.31	53.37	1.39	9.23	0.90
CLL11	$173.30 \pm 1.10$	-13.33	35.73	2.08	9.24	1.10
CMJ11	$172.60 \pm 0.70$	76.94	88.23	28.06	53.31	0.70
Correlations	—	—	-176.56	—	—	—
BLUE <sub>mt</sub>	$173.66 \pm 0.66$	100.00	100.00	42.56	100.00	0.66

Table 6: BLUE of the combination ( $\chi^2/\text{ndof} = 33.54/6$ ). For each input measurement  $i$  the following are listed: the central value weight  $\text{CVW}_i$  or  $\lambda_i$ , the intrinsic information weight  $\text{IIW}_i$ , the marginal information weight  $\text{MIW}_i$ , the relative importance  $\text{RI}_i$ . The intrinsic information weight  $\text{IIW}_{\text{corr}}$  of correlations is also shown on a separate row.

Parameter name	ParID	Parameter value ScaleFactor X @MIN	1/I <sup>nom</sup> *dI/dX			Fixed or Variable
			@0	@MIN	@1	
GlobalScaleFact	#0	$0.7076 \pm 0.8534$	-4.6629	$\sim 0$	13.8369	Variable

Table 7: Normalised Fisher information derivatives  $1/I^{\text{nom}}*dI/dX$  (before and after minimization) and minimization results. The derivatives in the table are computed with respect to scale factors X, representing the ratio of a given correlation to the corresponding nominal correlation, and all normalized by the information  $I^{\text{nom}}$  at nominal correlations ("@1"). They are computed at three different values of the scale factors X: for nominal values of all correlations (i.e. when all scale factors are 1: "@1"), for correlations all equal to zero (i.e. when all scale factors are 0: "@0") and for the scale factors minimizing Fisher information ("@MIN"). In the minimization, the scale factors X were varied (between 0 and 1, starting at 1) unless  $dI/dX@0 = dI/dX@1 = 0$ . A minimum was found in this minimization.

OffDiag & ErrSrc	bJES	OffDiag
ALJ11 / ALJ10	0.052	0.052
AJT11 / ALJ10	0.133	0.133
AJT11 / ALJ11	-0.046	-0.046
CLL10 / ALJ10	0.041	0.041
CLL10 / ALJ11	-0.014	-0.014
CLL10 / AJT11	-0.036	-0.036
CLJ10 / ALJ10	0.041	0.041
CLJ10 / ALJ11	-0.014	-0.014
CLJ10 / AJT11	-0.036	-0.036
CLJ10 / CLL10	-0.045	-0.045
CLL11 / ALJ10	-0.050	-0.050
CLL11 / ALJ11	0.017	0.017
CLL11 / AJT11	0.044	0.044
CLL11 / CLL10	0.055	0.055
CLL11 / CLJ10	0.055	0.055
CMJ11 / ALJ10	0.185	0.185
CMJ11 / ALJ11	-0.064	-0.064
CMJ11 / AJT11	-0.162	-0.162
CMJ11 / CLL10	-0.201	-0.201
CMJ11 / CLJ10	-0.201	-0.201
CMJ11 / CLL11	0.246	0.246
ErrSrc	$\sim 0$	GlobFact $\sim 0$

Table 8: Normalised Fisher information derivatives  $1/I \cdot dI/dX$  for the combination under consideration. The derivatives in the table are computed with respect to scale factors  $X$ , representing the ratio of a given correlation to its "current" value in the combination under consideration, and all normalized by the information  $I$  for the "current" values of correlations. They are computed for the "current" values of correlations (in this case: correlations in minimization by global factor). Color boxes indicate normalised derivatives greater than 0.05 (yellow), 0.10 (orange) and 0.15 (red). The last column and last row list information derivatives when the same rescaling factor is used for a given off-diagonal element or error source, which are equal to the sums of individual derivatives in each row and column, respectively.

	ALJ10	ALJ11	AJT11	CLL10	CLJ10	CLL11	CMJ11
ALJ10	6.25	2.69	2.35	0.76	0.76	0.92	0.59
ALJ11	2.69	2.56	1.51	0.48	0.48	0.59	0.38
AJT11	2.35	1.51	1.96	0.42	0.42	0.52	0.33
CLL10	0.76	0.48	0.42	0.81	0.54	0.67	0.42
CLJ10	0.76	0.48	0.42	0.54	0.81	0.67	0.42
CLL11	0.92	0.59	0.52	0.67	0.67	1.21	0.52
CMJ11	0.59	0.38	0.33	0.42	0.42	0.52	0.49

Table 9: Full input covariance between measurements (summed over error sources). Color boxes indicate covariances lower than nominal values by a factor up to 2 (green), up to 3 (cyan) or greater than 3 (blue).

$$\begin{pmatrix} & \text{ALJ10} & \text{ALJ11} & \text{AJT11} & \text{CLL10} & \text{CLJ10} & \text{CLL11} & \text{CMJ11} \\ \text{ALJ10} & 6.25 & \mathbf{2.69} & \mathbf{2.35} & \mathbf{0.76} & \mathbf{0.76} & \mathbf{0.92} & \mathbf{0.59} \\ \text{ALJ11} & \mathbf{2.69} & 2.56 & \mathbf{1.51} & \mathbf{0.48} & \mathbf{0.48} & \mathbf{0.59} & \mathbf{0.38} \\ \text{AJT11} & \mathbf{2.35} & \mathbf{1.51} & 1.96 & \mathbf{0.42} & \mathbf{0.42} & \mathbf{0.52} & \mathbf{0.33} \\ \text{CLL10} & \mathbf{0.76} & \mathbf{0.48} & \mathbf{0.42} & 0.81 & \mathbf{0.54} & \mathbf{0.67} & \mathbf{0.42} \\ \text{CLJ10} & \mathbf{0.76} & \mathbf{0.48} & \mathbf{0.42} & \mathbf{0.54} & 0.81 & \mathbf{0.67} & \mathbf{0.42} \\ \text{CLL11} & \mathbf{0.92} & \mathbf{0.59} & \mathbf{0.52} & \mathbf{0.67} & \mathbf{0.67} & 1.21 & \mathbf{0.52} \\ \text{CMJ11} & \mathbf{0.59} & \mathbf{0.38} & \mathbf{0.33} & \mathbf{0.42} & \mathbf{0.42} & \mathbf{0.52} & 0.49 \end{pmatrix}$$

Table 10: Partial input covariance between measurements. Error source #0: bJES. Color boxes indicate covariances lower than nominal values by a factor up to 2 (green), up to 3 (cyan) or greater than 3 (blue).

## 2.3 Minimize correlations by one factor per error source.

Measurements		CVW/%	IIW/%	MIW/%	RI/%	bJES
ALJ10	$169.30 \pm 2.50$	-8.83	6.92	5.10	6.12	2.50
ALJ11	$174.50 \pm 1.60$	4.75	16.89	0.60	3.29	1.60
AJT11	$174.90 \pm 1.40$	13.84	22.06	3.93	9.59	1.40
CLL10	$175.50 \pm 0.90$	13.31	53.37	1.39	9.23	0.90
CLJ10	$173.10 \pm 0.90$	13.31	53.37	1.39	9.23	0.90
CLL11	$173.30 \pm 1.10$	-13.33	35.73	2.08	9.24	1.10
CMJ11	$172.60 \pm 0.70$	76.94	88.23	28.06	53.31	0.70
Correlations	—	—	-176.56	—	—	—
BLUE <sub>mt</sub>	$173.66 \pm 0.66$	100.00	100.00	42.56	100.00	0.66

Table 11: BLUE of the combination ( $\chi^2/\text{ndof} = 33.54/6$ ). For each input measurement  $i$  the following are listed: the central value weight  $\text{CVW}_i$  or  $\lambda_i$ , the intrinsic information weight  $\text{IIW}_i$ , the marginal information weight  $\text{MIW}_i$ , the relative importance  $\text{RI}_i$ . The intrinsic information weight  $\text{IIW}_{\text{corr}}$  of correlations is also shown on a separate row.

Parameter name	ParID	Parameter value	$1/\text{I}^{\text{nom}} \cdot d\text{I}/d\text{X}$			Fixed or Variable
		ScaleFactor X @MIN	@0	@MIN	@1	
bJES	#0	$0.7076 \pm 0.8534$	-4.6629	$\sim 0$	13.8369	Variable

Table 12: Normalised Fisher information derivatives  $1/\text{I}^{\text{nom}} \cdot d\text{I}/d\text{X}$  (before and after minimization) and minimization results. The derivatives in the table are computed with respect to scale factors X, representing the ratio of a given correlation to the corresponding nominal correlation, and all normalized by the information  $\text{I}^{\text{nom}}$  at nominal correlations ("@1"). They are computed at three different values of the scale factors X: for nominal values of all correlations (i.e. when all scale factors are 1: "@1"), for correlations all equal to zero (i.e. when all scale factors are 0: "@0") and for the scale factors minimizing Fisher information ("@MIN"). In the minimization, the scale factors X were varied (between 0 and 1, starting at 1) unless  $d\text{I}/d\text{X}@0 = d\text{I}/d\text{X}@1 = 0$ . A minimum was found in this minimization.



OffDiag & ErrSrc	bJES	OffDiag
ALJ11 / ALJ10	0.052	0.052
AJT11 / ALJ10	0.133	0.133
AJT11 / ALJ11	-0.046	-0.046
CLL10 / ALJ10	0.041	0.041
CLL10 / ALJ11	-0.014	-0.014
CLL10 / AJT11	-0.036	-0.036
CLJ10 / ALJ10	0.041	0.041
CLJ10 / ALJ11	-0.014	-0.014
CLJ10 / AJT11	-0.036	-0.036
CLJ10 / CLL10	-0.045	-0.045
CLL11 / ALJ10	-0.050	-0.050
CLL11 / ALJ11	0.017	0.017
CLL11 / AJT11	0.044	0.044
CLL11 / CLL10	0.055	0.055
CLL11 / CLJ10	0.055	0.055
CMJ11 / ALJ10	0.185	0.185
CMJ11 / ALJ11	-0.064	-0.064
CMJ11 / AJT11	-0.162	-0.162
CMJ11 / CLL10	-0.201	-0.201
CMJ11 / CLJ10	-0.201	-0.201
CMJ11 / CLL11	0.246	0.246
ErrSrc	$\sim 0$	GlobFact $\sim 0$

Table 13: Normalised Fisher information derivatives  $1/I \cdot dI/dX$  for the combination under consideration. The derivatives in the table are computed with respect to scale factors  $X$ , representing the ratio of a given correlation to its "current" value in the combination under consideration, and all normalized by the information  $I$  for the "current" values of correlations. They are computed for the "current" values of correlations (in this case: correlations in minimization by error source). Color boxes indicate normalised derivatives greater than 0.05 (yellow), 0.10 (orange) and 0.15 (red). The last column and last row list information derivatives when the same rescaling factor is used for a given off-diagonal element or error source, which are equal to the sums of individual derivatives in each row and column, respectively.

	ALJ10	ALJ11	AJT11	CLL10	CLJ10	CLL11	CMJ11
ALJ10	6.25	2.69	2.35	0.76	0.76	0.92	0.59
ALJ11	2.69	2.56	1.51	0.48	0.48	0.59	0.38
AJT11	2.35	1.51	1.96	0.42	0.42	0.52	0.33
CLL10	0.76	0.48	0.42	0.81	0.54	0.67	0.42
CLJ10	0.76	0.48	0.42	0.54	0.81	0.67	0.42
CLL11	0.92	0.59	0.52	0.67	0.67	1.21	0.52
CMJ11	0.59	0.38	0.33	0.42	0.42	0.52	0.49

Table 14: Full input covariance between measurements (summed over error sources). Color boxes indicate covariances lower than nominal values by a factor up to 2 (green), up to 3 (cyan) or greater than 3 (blue).

$$\left( \begin{array}{c|ccccccc} & \text{ALJ10} & \text{ALJ11} & \text{AJT11} & \text{CLL10} & \text{CLJ10} & \text{CLL11} & \text{CMJ11} \\ \hline \text{ALJ10} & 6.25 & \mathbf{2.69} & \mathbf{2.35} & \mathbf{0.76} & \mathbf{0.76} & \mathbf{0.92} & \mathbf{0.59} \\ \text{ALJ11} & \mathbf{2.69} & 2.56 & \mathbf{1.51} & \mathbf{0.48} & \mathbf{0.48} & \mathbf{0.59} & \mathbf{0.38} \\ \text{AJT11} & \mathbf{2.35} & \mathbf{1.51} & 1.96 & \mathbf{0.42} & \mathbf{0.42} & \mathbf{0.52} & \mathbf{0.33} \\ \text{CLL10} & \mathbf{0.76} & \mathbf{0.48} & \mathbf{0.42} & 0.81 & \mathbf{0.54} & \mathbf{0.67} & \mathbf{0.42} \\ \text{CLJ10} & \mathbf{0.76} & \mathbf{0.48} & \mathbf{0.42} & \mathbf{0.54} & 0.81 & \mathbf{0.67} & \mathbf{0.42} \\ \text{CLL11} & \mathbf{0.92} & \mathbf{0.59} & \mathbf{0.52} & \mathbf{0.67} & \mathbf{0.67} & 1.21 & \mathbf{0.52} \\ \text{CMJ11} & \mathbf{0.59} & \mathbf{0.38} & \mathbf{0.33} & \mathbf{0.42} & \mathbf{0.42} & \mathbf{0.52} & 0.49 \end{array} \right)$$

Table 15: Partial input covariance between measurements. Error source #0: bJES. Color boxes indicate covariances lower than nominal values by a factor up to 2 (green), up to 3 (cyan) or greater than 3 (blue).

**2.4 Minimize correlations by one factor per off-diagonal element.**

Measurements		CVW/%	IIW/%	MIW/%	RI/%	bJES
ALJ10	169.30 $\pm$ 2.50	$\sim 0$	7.83	$\sim 0$	$\sim 0$	2.50
ALJ11	174.50 $\pm$ 1.60	$\sim 0$	19.13	$\sim 0$	$\sim 0$	1.60
AJT11	174.90 $\pm$ 1.40	1.61	24.98	0.03	1.61	1.40
CLL10	175.50 $\pm$ 0.90	$\sim 0$	60.45	$\sim 0$	$\sim 0$	0.90
CLJ10	173.10 $\pm$ 0.90	$\sim 0$	60.45	$\sim 0$	$\sim 0$	0.90
CLL11	173.30 $\pm$ 1.10	$\sim 0$	40.46	$\sim 0$	$\sim 0$	1.10
CMJ11	172.60 $\pm$ 0.70	98.39	99.92	35.52	98.38	0.70
Correlations	—	—	-213.21	—	—	—
BLUE <sub>mt</sub>	172.64 $\pm$ 0.70	100.00	100.00	35.56	100.00	0.70

Table 16: BLUE of the combination ( $\chi^2/\text{ndof} = 87.90/6$ ). For each input measurement  $i$  the following are listed: the central value weight  $\text{CVW}_i$  or  $\lambda_i$ , the intrinsic information weight  $\text{IIW}_i$ , the marginal information weight  $\text{MIW}_i$ , the relative importance  $\text{RI}_i$ . The intrinsic information weight  $\text{IIW}_{\text{corr}}$  of correlations is also shown on a separate row.

Parameter name	ParID	Parameter value ScaleFactor X @MIN	1/I <sup>nom</sup> *dI/dX			Fixed or Variable
			@0	@MIN	@1	
ALJ11/ALJ10	#0	0.6606 ± ~ 0	-0.0920	~ 0	1.2043	Variable
AJT11/ALJ10	#1	0.5574 ± ~ 0	-0.1051	~ 0	3.5609	Variable
AJT11/ALJ11	#2	0.8483 ± ~ 0	-0.1642	~ 0	-0.9058	Variable
CLL10/ALJ10	#3	0.5697 ± ~ 0	-0.0817	~ 0	-0.1874	Variable
CLL10/ALJ11	#4	0.9888 ± ~ 0	-0.1277	~ 0	0.0477	Variable
CLL10/AJT11	#5	0.9949 ± ~ 0	-0.1460	~ 0	0.1409	Variable
CLJ10/ALJ10	#6	0.5697 ± ~ 0	-0.0817	~ 0	-0.1874	Variable
CLJ10/ALJ11	#7	0.9888 ± ~ 0	-0.1277	~ 0	0.0477	Variable
CLJ10/AJT11	#8	0.9949 ± ~ 0	-0.1460	~ 0	0.1409	Variable
CLJ10/CLL10	#9	0.9982 ± ~ 0	-0.4542	~ 0	-0.0297	Variable
CLL11/ALJ10	#10	0.9263 ± ~ 0	-0.0669	~ 0	-2.8534	Variable
CLL11/ALJ11	#11	0.9953 ± ~ 0	-0.1045	~ 0	0.7259	Variable
CLL11/AJT11	#12	0.9453 ± ~ 0	-0.1194	~ 0	2.1462	Variable
CLL11/CLL10	#13	0.8539 ± ~ 0	-0.3716	~ 0	-0.4518	Variable
CLL11/CLJ10	#14	0.8539 ± 0.0001	-0.3716	~ 0	-0.4518	Variable
CMJ11/ALJ10	#15	0.5622 ± ~ 0	-0.1051	~ 0	4.0021	Variable
CMJ11/ALJ11	#16	0.8798 ± ~ 0	-0.1642	~ 0	-1.0181	Variable
CMJ11/AJT11	#17	1.0000 ± ~ 0	-0.1877	-0.0119	-3.0102	Variable
CMJ11/CLL10	#18	0.8152 ± ~ 0	-0.5839	~ 0	0.6336	Variable
CMJ11/CLJ10	#19	0.8152 ± ~ 0	-0.5839	~ 0	0.6336	Variable
CMJ11/CLL11	#20	0.6648 ± ~ 0	-0.4777	~ 0	9.6485	Variable

Table 17: Normalised Fisher information derivatives  $1/I^{\text{nom}}*dI/dX$  (before and after minimization) and minimization results. The derivatives in the table are computed with respect to scale factors X, representing the ratio of a given correlation to the corresponding nominal correlation, and all normalized by the information  $I^{\text{nom}}$  at nominal correlations ("@1"). They are computed at three different values of the scale factors X: for nominal values of all correlations (i.e. when all scale factors are 1: "@1"), for correlations all equal to zero (i.e. when all scale factors are 0: "@0") and for the scale factors minimizing Fisher information ("@MIN"). In the minimization, the scale factors X were varied (between 0 and 1, starting at onionized covariances) unless  $dI/dX@0 == dI/dX@1 == 0$ . A minimum was found in this minimization.

OffDiag & ErrSrc	bJES	OffDiag
ALJ11 / ALJ10	$\sim 0$	$\sim 0$
AJT11 / ALJ10	$\sim 0$	$\sim 0$
AJT11 / ALJ11	$\sim 0$	$\sim 0$
CLL10 / ALJ10	$\sim 0$	$\sim 0$
CLL10 / ALJ11	$\sim 0$	$\sim 0$
CLL10 / AJT11	$\sim 0$	$\sim 0$
CLJ10 / ALJ10	$\sim 0$	$\sim 0$
CLJ10 / ALJ11	$\sim 0$	$\sim 0$
CLJ10 / AJT11	$\sim 0$	$\sim 0$
CLJ10 / CLL10	$\sim 0$	$\sim 0$
CLL11 / ALJ10	$\sim 0$	$\sim 0$
CLL11 / ALJ11	$\sim 0$	$\sim 0$
CLL11 / AJT11	$\sim 0$	$\sim 0$
CLL11 / CLL10	$\sim 0$	$\sim 0$
CLL11 / CLJ10	$\sim 0$	$\sim 0$
CMJ11 / ALJ10	$\sim 0$	$\sim 0$
CMJ11 / ALJ11	$\sim 0$	$\sim 0$
CMJ11 / AJT11	-0.030	-0.030
CMJ11 / CLL10	$\sim 0$	$\sim 0$
CMJ11 / CLJ10	$\sim 0$	$\sim 0$
CMJ11 / CLL11	$\sim 0$	$\sim 0$
ErrSrc	-0.030	GlobFact -0.030

Table 18: Normalised Fisher information derivatives  $1/I \cdot dI/dX$  for the combination under consideration. The derivatives in the table are computed with respect to scale factors  $X$ , representing the ratio of a given correlation to its "current" value in the combination under consideration, and all normalized by the information  $I$  for the "current" values of correlations. They are computed for the "current" values of correlations (in this case: correlations in minimization by off-diagonal elements). Color boxes indicate normalised derivatives greater than 0.05 (yellow), 0.10 (orange) and 0.15 (red). The last column and last row list information derivatives when the same rescaling factor is used for a given off-diagonal element or error source, which are equal to the sums of individual derivatives in each row and column, respectively.

	ALJ10	ALJ11	AJT11	CLL10	CLJ10	CLL11	CMJ11
ALJ10	6.25	2.51	1.85	0.61	0.61	1.21	0.47
ALJ11	2.51	2.56	1.81	0.68	0.68	0.83	0.47
AJT11	1.85	1.81	1.96	0.60	0.60	0.69	0.47
CLL10	0.61	0.68	0.60	0.81	0.77	0.80	0.49
CLJ10	0.61	0.68	0.60	0.77	0.81	0.80	0.49
CLL11	1.21	0.83	0.69	0.80	0.80	1.21	0.49
CMJ11	0.47	0.47	0.47	0.49	0.49	0.49	0.49

Table 19: Full input covariance between measurements (summed over error sources). Color boxes indicate covariances lower than nominal values by a factor up to 2 (green), up to 3 (cyan) or greater than 3 (blue).

$$\left( \begin{array}{c|ccccccc} & \text{ALJ10} & \text{ALJ11} & \text{AJT11} & \text{CLL10} & \text{CLJ10} & \text{CLL11} & \text{CMJ11} \\ \hline \text{ALJ10} & 6.25 & \mathbf{2.51} & \mathbf{1.85} & \mathbf{0.61} & \mathbf{0.61} & \mathbf{1.21} & \mathbf{0.47} \\ \text{ALJ11} & \mathbf{2.51} & 2.56 & \mathbf{1.81} & \mathbf{0.68} & \mathbf{0.68} & \mathbf{0.83} & \mathbf{0.47} \\ \text{AJT11} & \mathbf{1.85} & \mathbf{1.81} & 1.96 & \mathbf{0.60} & \mathbf{0.60} & \mathbf{0.69} & \mathbf{0.47} \\ \text{CLL10} & \mathbf{0.61} & \mathbf{0.68} & \mathbf{0.60} & 0.81 & \mathbf{0.77} & \mathbf{0.80} & \mathbf{0.49} \\ \text{CLJ10} & \mathbf{0.61} & \mathbf{0.68} & \mathbf{0.60} & \mathbf{0.77} & 0.81 & \mathbf{0.80} & \mathbf{0.49} \\ \text{CLL11} & \mathbf{1.21} & \mathbf{0.83} & \mathbf{0.69} & \mathbf{0.80} & \mathbf{0.80} & 1.21 & \mathbf{0.49} \\ \text{CMJ11} & \mathbf{0.47} & \mathbf{0.47} & \mathbf{0.47} & \mathbf{0.49} & \mathbf{0.49} & \mathbf{0.49} & 0.49 \end{array} \right)$$

Table 20: Partial input covariance between measurements. Error source #0: bJES. Color boxes indicate covariances lower than nominal values by a factor up to 2 (green), up to 3 (cyan) or greater than 3 (blue).

## 2.5 Remove measurements with negative central value weights.

Measurements		CVW/%	IIW/%	MIW/%	RI/%	bJES
AJT11	$174.90 \pm 1.40$	1.61	24.98	0.08	1.61	1.40
CMJ11	$172.60 \pm 0.70$	98.39	99.92	75.02	98.39	0.70
Correlations	—	—	-24.90	—	—	—
BLUE <sub>mt</sub>	$172.64 \pm 0.70$	100.00	100.00	75.10	100.00	0.70

Table 21: BLUE of the combination ( $\chi^2/\text{ndof} = 3.48/1$ ). For each input measurement  $i$  the following are listed: the central value weight  $\text{CVW}_i$  or  $\lambda_i$ , the intrinsic information weight  $\text{IIW}_i$ , the marginal information weight  $\text{MIW}_i$ , the relative importance  $\text{RI}_i$ . The intrinsic information weight  $\text{IIW}_{\text{corr}}$  of correlations is also shown on a separate row.

N meas in BLUE	Measurement removed in iteration			BLUE	bJES	$\chi^2/\text{ndof}$
	Removed	CVW/%	MIW/%			
7	CLL11	-76.11	24.00	$173.84 \pm 0.44$	0.44	219.60/6
6	CLJ10	-47.91	5.41	$173.58 \pm 0.50$	0.50	218.42/5
5	CLL10	-75.13	16.42	$173.17 \pm 0.52$	0.52	207.20/4
4	ALJ10	-46.92	31.66	$175.88 \pm 0.57$	0.57	68.81/3
3	ALJ11	-26.49	3.69	$172.78 \pm 0.69$	0.69	4.67/2
2	NONE	N/A	N/A	$172.64 \pm 0.70$	0.70	3.48/1

Table 22: From the original combination of 7 with nominal correlations, a new combination where all remaining 2 measurements have central value weights  $\text{CVW} > 0$  was derived by removing measurements iteratively. At each step of the iteration, the measurement with the most negative  $\text{CVW} \leq 0$  in the combination with N measurements was removed until all remaining measurements had  $\text{CVW} > 0$  in the combination of N-1 measurements. For each iteration and for the final result, the results of the BLUE and the name, CVW and MIW of the measurement removed in that iteration are displayed.

OffDiag & ErrSrc	bJES	OffDiag
CMJ11 / AJT11	-0.030	-0.030
ErrSrc	-0.030	GlobFact -0.030

Table 23: Normalised Fisher information derivatives  $1/I \cdot dI/dX$  for the combination under consideration. The derivatives in the table are computed with respect to scale factors X, representing the ratio of a given correlation to its "current" value in the combination under consideration, and all normalized by the information I for the "current" values of correlations. They are computed for the "current" values of correlations (in this case: correlations in combination with  $\text{CVW} > 0$  measurements). Color boxes indicate normalised derivatives greater than 0.05 (yellow), 0.10 (orange) and 0.15 (red). The last column and last row list information derivatives when the same rescaling factor is used for a given off-diagonal element or error source, which are equal to the sums of individual derivatives in each row and column, respectively.

$$\left( \begin{array}{c|cc} & \text{AJT11} & \text{CMJ11} \\ \hline \text{AJT11} & 1.96 & 0.47 \\ \text{CMJ11} & 0.47 & 0.49 \end{array} \right)$$

Table 24: Full input covariance between measurements (summed over error sources).

$$\left( \begin{array}{c|cc} & \text{AJT11} & \text{CMJ11} \\ \hline \text{AJT11} & 1.96 & 0.47 \\ \text{CMJ11} & 0.47 & 0.49 \end{array} \right)$$

Table 25: Partial input covariance between measurements. Error source #0: bJES.



## 2.6 Onionize correlations.

Measurements		CVW/%	IIW/%	MIW/%	RI/%	bJES
ALJ10	169.30 $\pm$ 2.50	0.02	7.82	$\sim$ 0	0.02	2.50
ALJ11	174.50 $\pm$ 1.60	-4.04	19.09	0.17	3.71	1.60
AJT11	174.90 $\pm$ 1.40	5.59	24.93	0.28	5.14	1.40
CLL10	175.50 $\pm$ 0.90	0.25	60.32	$\sim$ 0	0.23	0.90
CLJ10	173.10 $\pm$ 0.90	0.25	60.32	$\sim$ 0	0.23	0.90
CLL11	173.30 $\pm$ 1.10	-0.37	40.38	$\sim$ 0	0.34	1.10
CMJ11	172.60 $\pm$ 0.70	98.29	99.72	35.01	90.33	0.70
Correlations	—	—	-212.59	—	—	—
BLUE <sub>mt</sub>	172.66 $\pm$ 0.70	100.00	100.00	35.46	100.00	0.70

Table 26: BLUE of the combination ( $\chi^2/\text{ndof} = 94.69/6$ ). For each input measurement  $i$  the following are listed: the central value weight  $\text{CVW}_i$  or  $\lambda_i$ , the intrinsic information weight  $\text{IIW}_i$ , the marginal information weight  $\text{MIW}_i$ , the relative importance  $\text{RI}_i$ . The intrinsic information weight  $\text{IIW}_{\text{corr}}$  of correlations is also shown on a separate row.

OffDiag & ErrSrc	bJES	OffDiag
ALJ11 / ALJ10	$\sim 0$	$\sim 0$
AJT11 / ALJ10	$\sim 0$	$\sim 0$
AJT11 / ALJ11	0.018	0.018
CLL10 / ALJ10	$\sim 0$	$\sim 0$
CLL10 / ALJ11	$\sim 0$	$\sim 0$
CLL10 / AJT11	$\sim 0$	$\sim 0$
CLJ10 / ALJ10	$\sim 0$	$\sim 0$
CLJ10 / ALJ11	$\sim 0$	$\sim 0$
CLJ10 / AJT11	$\sim 0$	$\sim 0$
CLJ10 / CLL10	$\sim 0$	$\sim 0$
CLL11 / ALJ10	$\sim 0$	$\sim 0$
CLL11 / ALJ11	-0.001	-0.001
CLL11 / AJT11	0.001	0.001
CLL11 / CLL10	$\sim 0$	$\sim 0$
CLL11 / CLJ10	$\sim 0$	$\sim 0$
CMJ11 / ALJ10	$\sim 0$	$\sim 0$
CMJ11 / ALJ11	0.080	0.080
CMJ11 / AJT11	-0.105	-0.105
CMJ11 / CLL10	-0.005	-0.005
CMJ11 / CLJ10	-0.005	-0.005
CMJ11 / CLL11	0.007	0.007
ErrSrc	-0.010	GlobFact -0.010

Table 27: Normalised Fisher information derivatives  $1/I \cdot dI/dX$  for the combination under consideration. The derivatives in the table are computed with respect to scale factors  $X$ , representing the ratio of a given correlation to its "current" value in the combination under consideration, and all normalized by the information  $I$  for the "current" values of correlations. They are computed for the "current" values of correlations (in this case: correlations in onionization 1st recipe). Color boxes indicate normalised derivatives greater than 0.05 (yellow), 0.10 (orange) and 0.15 (red). The last column and last row list information derivatives when the same rescaling factor is used for a given off-diagonal element or error source, which are equal to the sums of individual derivatives in each row and column, respectively.

	ALJ10	ALJ11	AJT11	CLL10	CLJ10	CLL11	CMJ11
ALJ10	6.25	2.56	1.96	0.81	0.81	1.21	0.49
ALJ11	2.56	2.56	1.96	0.68	0.68	0.84	0.49
AJT11	1.96	1.96	1.96	0.60	0.60	0.73	0.47
CLL10	0.81	0.68	0.60	0.81	0.77	0.81	0.49
CLJ10	0.81	0.68	0.60	0.77	0.81	0.81	0.49
CLL11	1.21	0.84	0.73	0.81	0.81	1.21	0.49
CMJ11	0.49	0.49	0.47	0.49	0.49	0.49	0.49

Table 28: Full input covariance between measurements (summed over error sources). Color boxes indicate covariances lower than nominal values by a factor up to 2 (green), up to 3 (cyan) or greater than 3 (blue).

$$\left( \begin{array}{c|ccccccc} & \text{ALJ10} & \text{ALJ11} & \text{AJT11} & \text{CLL10} & \text{CLJ10} & \text{CLL11} & \text{CMJ11} \\ \hline \text{ALJ10} & 6.25 & \mathbf{2.56} & \mathbf{1.96} & \mathbf{0.81} & \mathbf{0.81} & \mathbf{1.21} & \mathbf{0.49} \\ \text{ALJ11} & \mathbf{2.56} & 2.56 & \mathbf{1.96} & 0.68 & 0.68 & 0.84 & \mathbf{0.49} \\ \text{AJT11} & \mathbf{1.96} & \mathbf{1.96} & 1.96 & 0.60 & 0.60 & 0.73 & 0.47 \\ \text{CLL10} & \mathbf{0.81} & 0.68 & 0.60 & 0.81 & 0.77 & \mathbf{0.81} & \mathbf{0.49} \\ \text{CLJ10} & \mathbf{0.81} & 0.68 & 0.60 & 0.77 & 0.81 & \mathbf{0.81} & \mathbf{0.49} \\ \text{CLL11} & \mathbf{1.21} & 0.84 & 0.73 & \mathbf{0.81} & \mathbf{0.81} & 1.21 & \mathbf{0.49} \\ \text{CMJ11} & \mathbf{0.49} & \mathbf{0.49} & 0.47 & \mathbf{0.49} & \mathbf{0.49} & \mathbf{0.49} & 0.49 \end{array} \right)$$

Table 29: Partial input covariance between measurements. Error source #0: bJES. Color boxes indicate covariances lower than nominal values by a factor up to 2 (green), up to 3 (cyan) or greater than 3 (blue).

## 2.7 Zero correlations.

Measurements		CVW/%	IIW/%	MIW/%	RI/%	bJES
ALJ10	$169.30 \pm 2.50$	2.50	2.50	2.50	2.50	2.50
ALJ11	$174.50 \pm 1.60$	6.11	6.11	6.11	6.11	1.60
AJT11	$174.90 \pm 1.40$	7.98	7.98	7.98	7.98	1.40
CLL10	$175.50 \pm 0.90$	19.30	19.30	19.30	19.30	0.90
CLJ10	$173.10 \pm 0.90$	19.30	19.30	19.30	19.30	0.90
CLL11	$173.30 \pm 1.10$	12.92	12.92	12.92	12.92	1.10
CMJ11	$172.60 \pm 0.70$	31.90	31.90	31.90	31.90	0.70
Correlations	—	—	0	—	—	—
BLUE <sub>mt</sub>	$173.56 \pm 0.40$	100.00	100.00	100.00	100.00	0.40

Table 30: BLUE of the combination ( $\chi^2/\text{ndof} = 11.01/6$ ). For each input measurement  $i$  the following are listed: the central value weight  $\text{CVW}_i$  or  $\lambda_i$ , the intrinsic information weight  $\text{IIW}_i$ , the marginal information weight  $\text{MIW}_i$ , the relative importance  $\text{RI}_i$ . The intrinsic information weight  $\text{IIW}_{\text{corr}}$  of correlations is also shown on a separate row.

OffDiag & ErrSrc	bJES	OffDiag
ALJ11 / ALJ10	0	0
AJT11 / ALJ10	0	0
AJT11 / ALJ11	0	0
CLL10 / ALJ10	0	0
CLL10 / ALJ11	0	0
CLL10 / AJT11	0	0
CLJ10 / ALJ10	0	0
CLJ10 / ALJ11	0	0
CLJ10 / AJT11	0	0
CLJ10 / CLL10	0	0
CLL11 / ALJ10	0	0
CLL11 / ALJ11	0	0
CLL11 / AJT11	0	0
CLL11 / CLL10	0	0
CLL11 / CLJ10	0	0
CMJ11 / ALJ10	0	0
CMJ11 / ALJ11	0	0
CMJ11 / AJT11	0	0
CMJ11 / CLL10	0	0
CMJ11 / CLJ10	0	0
CMJ11 / CLL11	0	0
ErrSrc	0	GlobFact 0

Table 31: Normalised Fisher information derivatives  $1/I \cdot dI/dX$  for the combination under consideration. The derivatives in the table are computed with respect to scale factors  $X$ , representing the ratio of a given correlation to its "current" value in the combination under consideration, and all normalized by the information  $I$  for the "current" values of correlations. They are computed for the "current" values of correlations (in this case: zero correlations). Color boxes indicate normalised derivatives greater than 0.05 (yellow), 0.10 (orange) and 0.15 (red). The last column and last row list information derivatives when the same rescaling factor is used for a given off-diagonal element or error source, which are equal to the sums of individual derivatives in each row and column, respectively.

	ALJ10	ALJ11	AJT11	CLL10	CLJ10	CLL11	CMJ11
ALJ10	6.25	0	0	0	0	0	0
ALJ11	0	2.56	0	0	0	0	0
AJT11	0	0	1.96	0	0	0	0
CLL10	0	0	0	0.81	0	0	0
CLJ10	0	0	0	0	0.81	0	0
CLL11	0	0	0	0	0	1.21	0
CMJ11	0	0	0	0	0	0	0.49

Table 32: Full input covariance between measurements (summed over error sources). Color boxes indicate covariances lower than nominal values by a factor up to 2 (green), up to 3 (cyan) or greater than 3 (blue).

$$\left( \begin{array}{c|ccccccc} & \text{ALJ10} & \text{ALJ11} & \text{AJT11} & \text{CLL10} & \text{CLJ10} & \text{CLL11} & \text{CMJ11} \\ \hline \text{ALJ10} & 6.25 & 0 & 0 & 0 & 0 & 0 & 0 \\ \text{ALJ11} & 0 & 2.56 & 0 & 0 & 0 & 0 & 0 \\ \text{AJT11} & 0 & 0 & 1.96 & 0 & 0 & 0 & 0 \\ \text{CLL10} & 0 & 0 & 0 & 0.81 & 0 & 0 & 0 \\ \text{CLJ10} & 0 & 0 & 0 & 0 & 0.81 & 0 & 0 \\ \text{CLL11} & 0 & 0 & 0 & 0 & 0 & 1.21 & 0 \\ \text{CMJ11} & 0 & 0 & 0 & 0 & 0 & 0 & 0.49 \end{array} \right)$$

Table 33: Partial input covariance between measurements. Error source #0: bJES. Color boxes indicate covariances lower than nominal values by a factor up to 2 (green), up to 3 (cyan) or greater than 3 (blue).

## Appendix A1. Input data.

```

1 #=====
2 #---- BlueFin input data file -----
3 #=====
4
5 # The file is expected to have the following format.
6 # Blank lines and lines with only empty spaces are ignored.
7 # Lines starting by '#' are reserved for comments and are ignored.
8 # Data lines are composed of fields separated by one or more empty spaces.
9 # Fields cannot contain empty spaces, with the exception of the title line.
10
11 # The next line must have 2 fields: 'TITLE' and the title of the
12 # BlueFin combination, which must be enclosed within double quotes
13 # and may contain only alphanumeric characters or spaces or hyphens.
14 TITLE "LHC top mass combination 2012"
15
16 # The next line must have 2 fields: 'NOBS' and the number of observables.
17 NOBS 1
18
19 # The next line must have 2 fields: 'NMEA' and the number of measurements.
20 NMEA 7
21
22 # The next line must have 2 fields: 'NERR' and the number of error sources.
23 NERR 1
24
25 # The next NERR+3 lines must have NMEA+1 fields in this format:
26 # - in the 1st line: 'MEANAME' followed by NMEA distinct measurement names
27 #   (measurement names may contain only alphanumeric characters or spaces);
28 # - in the 2nd line: 'OBSNAME' followed by the NMEA names (with NOBS distinct
29 #   values) of the observables measured by the corresponding measurements
30 #   (observable names may contain only alphanumeric characters or spaces
31 #   and should preferably be at most 3 characters long);
32 # - in the 3rd line: 'MEAVAL' followed by the NMEA measured central values;
33 # - in each of the last NERR lines: the error source name followed by the
34 #   NMEA partial errors for each measurement due to the given error source
35 #   (error source names may contain only alphanumeric characters or spaces).
36 MEANAME    ALJ10    ALJ11    AJT11    CLL10    CLJ10    CLL11    CMJ11
37 OBSNAME     mt      mt      mt      mt      mt      mt      mt
38 MEAVAL  169.3000  174.5000  174.9000  175.5000  173.1000  173.3000  172.6000
39 bJES      2.5000   1.6000   1.4000   0.9000   0.9000   1.1000   0.7000
40
41 # The next NMEA*(NMEA-1)/2+1 rows must have NERR+2 fields in this format:
42 # - in the 1st line: 'CMEA1' 'CMEA2' (correlations between 2 measurements)
43 #   followed by the NERR error source names in the same order used above;
44 # - in each of the NMEA*(NMEA-1)/2 last lines: the names of two distinct
45 #   measurements followed by the NERR correlations between the partial
46 #   errors on the two measurements due to corresponding error source.
47 # Measurements must appear in the same order listed above.
48 CMEA1 CMEA2 bJES
49 ALJ10 ALJ11 .9500

```

50	ALJ10	AJT11	.9500
51	ALJ10	CLL10	.4750
52	ALJ10	CLJ10	.4750
53	ALJ10	CLL11	.4750
54	ALJ10	CMJ11	.4750
55	ALJ11	AJT11	.9500
56	ALJ11	CLL10	.4750
57	ALJ11	CLJ10	.4750
58	ALJ11	CLL11	.4750
59	ALJ11	CMJ11	.4750
60	AJT11	CLL10	.4750
61	AJT11	CLJ10	.4750
62	AJT11	CLL11	.4750
63	AJT11	CMJ11	.4750
64	CLL10	CLJ10	.9500
65	CLL10	CLL11	.9500
66	CLL10	CMJ11	.9500
67	CLJ10	CLL11	.9500
68	CLJ10	CMJ11	.9500
69	CLL11	CMJ11	.9500

Input data file: lhc2012bJESonly.bfin.