1 Nominal correlations.

Measu	rements	CVW/%	IIW/%	MIW/%	RI/%	Error
AXS	103.00 ± 3.87	40.00	40.00	40.00	25.00	3.87
B1XS	99.00 ± 4.00	90.00	37.50	50.63	56.25	4.00
B2XS	101.00 ± 8.00	-30.00	9.38	22.50	18.75	8.00
Correlations		_	13.13	_	_	_
BLUE xs	100.00 ± 2.45	100.00	100.00	113.13	100.00	2.45

Table 1: BLUE of the combination ($\chi^2/\text{ndof} = 1.17/2$). For each input measurement i the following are listed: the central value weight CVW_i or λ_i , the intrinsic information weight IIW_i, the marginal information weight MIW_i, the relative importance RI_i. The intrinsic information weight IIW_{corr} of correlations is also shown on a separate row.

OffDiag & ErrSrc	Error	OffDiag
B1XS / AXS	0	0
B2XS / AXS	0	0
B2XS / B1XS	2.520	2.520
ErrSrc	2.520	GlobFact
Elisic	2.020	2.520

Table 2: Normalised Fisher information derivatives 1/I*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.

$$\begin{pmatrix} & | \text{AXS B1XS B2XS} \\ \hline \text{AXS} & | 15.00 & 0 & 0 \\ \text{B1XS} & 0 & | 16.00 & | 28.00 \\ \text{B2XS} & 0 & | | 28.00 & | | 64.00 \end{pmatrix}$$

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

$$\begin{pmatrix} & | \text{AXS B1XS B2XS} \\ \hline \text{AXS} & | 15.00 & 0 & 0 \\ \text{B1XS} & 0 & | 16.00 & | 28.00 \\ \text{B2XS} & 0 & | | 28.00 & | 64.00 \end{pmatrix}$$

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

2 Modified correlations.

2.1 Summary of results.

Combination	BLUE	Error	χ^2/ndof
Nominal correlations	100.00 ± 2.45	2.45	1.17/2
Minimize by global factor	101.06 ± 2.78	2.78	0.60/2
Minimize by error sources	101.06 ± 2.78	2.78	0.60/2
Minimize by off-diagonal elements	101.06 ± 2.78	2.78	0.60/2
Remove negative CVWs	101.06 ± 2.78	2.78	0.52/1
Onionize	101.06 ± 2.78	2.78	0.60/2
NO correlations	101.06 ± 2.63	2.63	0.52/2

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

2.2 Minimize correlations by a global rescaling factor.

Measu	rements	CVW/%	IIW/%	MIW/%	RI/%	Error
AXS	103.00 ± 3.87	51.61	51.61	51.61	51.61	3.87
B1XS	99.00 ± 4.00	48.39	48.39	36.29	48.39	4.00
B2XS	101.00 ± 8.00	~ 0	12.10	~ 0	~ 0	8.00
Correlations		_	-12.10	_	_	_
BLUE xs	101.06 ± 2.78	100.00	100.00	87.90	100.00	2.78

Table 6: BLUE of the combination ($\chi^2/\text{ndof} = 0.60/2$). For each input measurement i the following are listed: the central value weight CVW_i or λ_i , the intrinsic information weight IIW_i, the marginal information weight MIW_i, the relative importance RI_i. The intrinsic information weight IIW_{corr} of correlations is also shown on a separate row.

Parameter name	ParID	Parameter value	1/I ^{nom} *dI/dX			Fixed or
		ScaleFactor X @MIN	@0	@MIN	@1	Variable
GlobalScaleFact	#0	0.5715 ± 0.5405	-0.3281	~ 0	2.5200	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^{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	Error	OffDiag
B1XS / AXS	0	0
B2XS / AXS	0	0
B2XS / B1XS	~ 0	~ 0
ErrSrc	~ 0	GlobFact
Elisic	~ 0	~ 0

Table 8: Normalised Fisher information derivatives 1/I*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.

$$\begin{pmatrix} & | \text{AXS B1XS B2XS} \\ \hline \text{AXS} & | 15.00 & 0 & 0 \\ \text{B1XS} & 0 & | 16.00 & | 16.00 \\ \text{B2XS} & 0 & | | 16.00 & | | 64.00 \end{pmatrix}$$

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).

$$\begin{pmatrix} & | \text{AXS} & \text{B1XS} & \text{B2XS} \\ \hline \text{AXS} & | 15.00 & 0 & 0 \\ \text{B1XS} & 0 & | 16.00 & | 16.00 \\ \text{B2XS} & 0 & | | 16.00 & | 64.00 \end{pmatrix}$$

Table 10: Partial input covariance between measurements. Error source #0: Error. 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.

Measu	rements	CVW/%	IIW/%	MIW/%	RI/%	Error
AXS	103.00 ± 3.87	51.61	51.61	51.61	51.61	3.87
B1XS	99.00 ± 4.00	48.39	48.39	36.29	48.39	4.00
B2XS	101.00 ± 8.00	~ 0	12.10	~ 0	~ 0	8.00
Correlations		_	-12.10	_	_	_
BLUE xs	101.06 ± 2.78	100.00	100.00	87.90	100.00	2.78

Table 11: BLUE of the combination ($\chi^2/\text{ndof} = 0.60/2$). For each input measurement i the following are listed: the central value weight CVW_i or λ_i , the intrinsic information weight IIW_i, the marginal information weight MIW_i, the relative importance RI_i. The intrinsic information weight IIW_{corr} of correlations is also shown on a separate row.

Parameter name	ParID	Parameter value	$1/I^{\text{nom}}*dI/dX$		Fixed or	
		ScaleFactor X @MIN	@0	@MIN	@1	Variable
Error	#0	0.5715 ± 0.5405	-0.3281	~ 0	2.5200	Variable

Table 12: 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^{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	Error	OffDiag
B1XS / AXS	0	0
B2XS / AXS	0	0
B2XS / B1XS	~ 0	~ 0
ErrSrc	~ 0	GlobFact
Elisic	~ 0	~ 0

Table 13: Normalised Fisher information derivatives 1/I*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.

$$\begin{pmatrix} & | \text{AXS B1XS B2XS} \\ \hline \text{AXS} & | 15.00 & 0 & 0 \\ \text{B1XS} & 0 & | 16.00 & | 16.00 \\ \text{B2XS} & 0 & | | 16.00 & | | 64.00 \end{pmatrix}$$

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).

$$\begin{pmatrix} & | AXS | B1XS | B2XS \\ \hline AXS | 15.00 & 0 & 0 \\ B1XS | 0 & 16.00 & 16.00 \\ B2XS | 0 & 16.00 & 64.00 \end{pmatrix}$$

Table 15: Partial input covariance between measurements. Error source #0: Error. 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.

Measu	rements	CVW/%	IIW/%	MIW/%	RI/%	Error
AXS	103.00 ± 3.87	51.61	51.61	51.61	51.61	3.87
B1XS	99.00 ± 4.00	48.39	48.39	36.29	48.39	4.00
B2XS	101.00 ± 8.00	~ 0	12.10	~ 0	~ 0	8.00
Correlations	_	_	-12.10	_	_	_
BLUE xs	101.06 ± 2.78	100.00	100.00	87.90	100.00	2.78

Table 16: BLUE of the combination ($\chi^2/\text{ndof} = 0.60/2$). For each input measurement i the following are listed: the central value weight CVW_i or λ_i , the intrinsic information weight IIW_i, the marginal information weight MIW_i, the relative importance RI_i. The intrinsic information weight IIW_{corr} of correlations is also shown on a separate row.

Parameter name	ParID	Parameter value	1/	$I^{\text{nom}}*dI/d$	lX	Fixed or
		ScaleFactor X @MIN	@0	@MIN	@1	Variable
B1XS/AXS	#0	$1.0000 \pm N/A$	0	0	0	FIXED
B2XS/AXS	#1	$1.0000 \pm N/A$	0	0	0	FIXED
B2XS/B1XS	#2	0.5714 ± 0.5405	-0.3281	0	2.5200	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^{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	Error	OffDiag
B1XS / AXS	0	0
B2XS / AXS	0	0
B2XS / B1XS	0	0
ErrSrc	0	GlobFact
Elisic		0

Table 18: Normalised Fisher information derivatives 1/I*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.

$$\begin{pmatrix} & | AXS | B1XS | B2XS \\ \hline AXS | | 15.00 | 0 & 0 \\ B1XS | 0 & | 16.00 | \hline B2XS | 0 & | 16.00 | 64.00 \end{pmatrix}$$

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).

Table 20: Partial input covariance between measurements. Error source #0: Error. 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/%	Error
AXS	103.00 ± 3.87	51.61	51.61	51.61	51.61	3.87
B1XS	99.00 ± 4.00	48.39	48.39	48.39	48.39	4.00
Correlations	_	_	0	_	_	_
BLUE xs	101.06 ± 2.78	100.00	100.00	100.00	100.00	2.78

Table 21: BLUE of the combination ($\chi^2/\text{ndof} = 0.52/1$). For each input measurement i the following are listed: the central value weight CVW_i or λ_i , the intrinsic information weight IIW_i, the marginal information weight MIW_i, the relative importance RI_i. The intrinsic information weight IIW_{corr} of correlations is also shown on a separate row.

N meas	Measurement removed in iteration			BLUE	Error	χ^2/ndof
in BLUE	Removed	CVW/%	MIW/%	BLOE	Error	χ / πασι
3	B2XS	-30.00	22.50	100.00 ± 2.45	2.45	1.17/2
2	NONE	N/A	N/A	101.06 ± 2.78	2.78	0.52/1

Table 22: From the original combination of 3 with nominal correlations, a new combination where all remaining 2 measurements have central value weights CVW>0 was derived by removing measurements iteratively. At each step of the iteration, the measurement with the most negative CVW<=0 in the combination with N measurements was removed until all remaining measurements had 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	Error	OffDiag
B1XS / AXS	0	0
ErrSrc	0	GlobFact
Elibic		0

Table 23: Normalised Fisher information derivatives 1/I*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 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.

$$\begin{pmatrix}
 & AXS & B1XS \\
\hline
AXS & 15.00 & 0 \\
B1XS & 0 & 16.00
\end{pmatrix}$$

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

$$\left(\begin{array}{c|cc} & AXS & B1XS \\ \hline AXS & 15.00 & 0 \\ B1XS & 0 & 16.00 \end{array}\right)$$

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

2.6 Onionize correlations.

Measurements		CVW/%	IIW/%	MIW/%	RI/%	Error
AXS	103.00 ± 3.87	51.61	51.61	51.61	51.61	3.87
B1XS	99.00 ± 4.00	48.39	48.39	36.29	48.39	4.00
B2XS	101.00 ± 8.00	0	12.10	~ 0	0	8.00
Correlations	_	_	-12.10	_	_	_
BLUE xs	101.06 ± 2.78	100.00	100.00	87.90	100.00	2.78

Table 26: BLUE of the combination ($\chi^2/\text{ndof} = 0.60/2$). For each input measurement i the following are listed: the central value weight CVW_i or λ_i , the intrinsic information weight IIW_i, the marginal information weight MIW_i, the relative importance RI_i. The intrinsic information weight IIW_{corr} of correlations is also shown on a separate row.

OffDiag & ErrSrc	Error	OffDiag
B1XS / AXS	0	0
B2XS / AXS	0	0
B2XS / B1XS	0	0
ErrSrc	0	GlobFact
Elisic	0	0

Table 27: Normalised Fisher information derivatives 1/I*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.

$$\begin{pmatrix} & \text{AXS B1XS B2XS} \\ \hline \text{AXS} & 15.00 & 0 & 0 \\ \text{B1XS} & 0 & 16.00 & 16.00 \\ \text{B2XS} & 0 & 16.00 & 64.00 \end{pmatrix}$$

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).

$$\begin{pmatrix} & | \text{AXS B1XS B2XS} \\ \hline \text{AXS} & | 15.00 & 0 & 0 \\ \text{B1XS} & 0 & | 16.00 & | 16.00 \\ \text{B2XS} & 0 & | | 16.00 & | | 64.00 \end{pmatrix}$$

Table 29: Partial input covariance between measurements. Error source #0: Error. 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/%	Error
AXS	103.00 ± 3.87	46.04	46.04	46.04	46.04	3.87
B1XS	99.00 ± 4.00	43.17	43.17	43.17	43.17	4.00
B2XS	101.00 ± 8.00	10.79	10.79	10.79	10.79	8.00
Correlations	_	_	0	_	_	_
BLUE xs	101.06 ± 2.63	100.00	100.00	100.00	100.00	2.63

Table 30: BLUE of the combination ($\chi^2/\text{ndof} = 0.52/2$). For each input measurement i the following are listed: the central value weight CVW_i or λ_i , the intrinsic information weight IIW_i, the marginal information weight MIW_i, the relative importance RI_i. The intrinsic information weight IIW_{corr} of correlations is also shown on a separate row.

OffDiag & ErrSrc	Error	OffDiag
B1XS / AXS	0	0
B2XS / AXS	0	0
B2XS / B1XS	0	0
ErrSrc	0	GlobFact
Elisic	U	0

Table 31: Normalised Fisher information derivatives 1/I*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.

$$\begin{pmatrix} & | \text{AXS B1XS B2XS} \\ \hline \text{AXS} & | 15.00 & 0 & 0 \\ \text{B1XS} & 0 & | 16.00 & 0 \\ \text{B2XS} & 0 & | 0 & | 64.00 \end{pmatrix}$$

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).

$$\begin{pmatrix} & | AXS | B1XS | B2XS \\ \hline AXS | 15.00 & 0 & 0 \\ B1XS | 0 & 16.00 & 0 \\ B2XS | 0 & 0 & 64.00 \end{pmatrix}$$

Table 33: Partial input covariance between measurements. Error source #0: Error. 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.

```
4
   # The file is expected to have the following format.
   # Blank lines and lines with only empty spaces are ignored.
   # Lines starting by '#' are reserved for comments and are ignored.
   # Data lines are composed of fields separated by one or more empty spaces.
   # 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
   # BlueFin combination, which must be enclosed within double quotes
   # and may contain only alphanumeric characters or spaces or hyphens.
   TITLE "Cross section example XSE"
14
15
   # The next line must have 2 fields: 'NOBS' and the number of observables.
16
17
   NOBS 1
18
   # The next line must have 2 fields: 'NMEA' and the number of measurements.
19
20
   NMEA 3
21
   # 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:
   # - in the 1st line: 'MEANAME' followed by NMEA distinct measurement names
27
      (measurement names may contain only alphanumeric characters or spaces);
   # - in the 2nd line: 'OBSNAME' followed by the NMEA names (with NOBS distinct
       values) of the observables measured by the corresponding measurements
       (observable names may contain only alphanumeric characters or spaces
30
31
       and should preferably be at most 3 characters long);
  # - in the 3rd line: 'MEAVAL' followed by the NMEA measured central values;
  # - in each of the last NERR lines: the error source name followed by the
      NMEA partial errors for each measurement due to the given error source
35
      (error source names may contain only alphanumeric characters or spaces).
   MEANAME
                  AXS
                          B1XS
                                    B2XS
   OBSNAME
                   xs
                            XS
   MEAVAL
             103.0000
                       99.0000
                                101.0000
   Error
               3.8730
                       4.0000
                                   8.0000
40
   # The next NMEA * (NMEA - 1)/2+1 rows must have NERR+2 fields in this format:
41
   # - in the 1st line: 'CMEA1' 'CMEA2' (correlations between 2 measurements)
      followed by the NERR error source names in the same order used above;
  # - in each of the NMEA*(NMEA-1)/2 last lines: the names of two distinct
       measurements followed by the NERR correlations between the partial
45
46
       errors on the two measurements due to corresponding error source.
       Measurements must appear in the same order listed above.
   CMEA1 CMEA2
                Error
   AXS
         B1XS
                 0.0000
```

50 AXS B2XS 0.0000 51 B1XS B2XS 0.8750

Input data file: xsePaper3.bfin.