

## 1 Nominal correlations.

| Measurements        |              | CVW <sub>ele</sub> /% | CVW <sub>tau</sub> /% | Stat | Sys1 | Sys2 | Sys3 | Sys4 |
|---------------------|--------------|-----------------------|-----------------------|------|------|------|------|------|
| Aele                | 10.50 ± 1.00 | 86.70                 | 0                     | 0    | 0    | 0    | 1.00 | 0    |
| Bele                | 13.50 ± 3.00 | 13.30                 | 0                     | 0    | 0    | 0    | 3.00 | 0    |
| BLUE <sub>ele</sub> | 10.90 ± 0.90 | 100.00                | 0                     | 0    | 0    | 0    | 0.90 | 0    |

| Measurements        |              | CVW <sub>ele</sub> /% | CVW <sub>tau</sub> /% | Stat | Sys1 | Sys2 | Sys3 | Sys4 |
|---------------------|--------------|-----------------------|-----------------------|------|------|------|------|------|
| Atau                | 9.50 ± 3.00  | 0                     | 50.00                 | 0    | 0    | 3.00 | 0    | 0    |
| Btau                | 14.00 ± 3.00 | 0                     | 50.00                 | 0    | 0    | 0    | 0    | 3.00 |
| BLUE <sub>tau</sub> | 11.75 ± 2.12 | 0                     | 100.00                | 0    | 0    | 1.50 | 0    | 1.50 |

Table 1: BLUE's of the combination ( $\chi^2/\text{ndof} = 1.95/2$ ). Values /10000 are displayed. For each input measurement  $i$ , the central value weight CVW or  $\lambda_i^\alpha$  with which that measurement contributes to the BLUE for observable  $\alpha$  is listed.

$$\left( \begin{array}{c|cc} & \text{ele} & \text{tau} \\ \hline \text{ele} & 1.00 & 0 \\ \text{tau} & 0 & 1.00 \end{array} \right)$$

Table 2: Correlations between the BLUE's.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 1.00 & 0 & -0.45 & 0 \\ \text{Atau} & 0 & 9.00 & 0 & 0 \\ \text{Bele} & -0.45 & 0 & 9.00 & 0 \\ \text{Btau} & 0 & 0 & 0 & 9.00 \end{array} \right)$$

Table 3: Full input covariance between measurements (summed over error sources). Values /100M are displayed.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 0 & 0 & 0 & 0 \\ \text{Atau} & 0 & 0 & 0 & 0 \\ \text{Bele} & 0 & 0 & 0 & 0 \\ \text{Btau} & 0 & 0 & 0 & 0 \end{array} \right)$$

Table 4: Partial input covariance between measurements. Error source #0: Stat. Values /100M are displayed.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 0 & 0 & 0 & 0 \\ \text{Atau} & 0 & 0 & 0 & 0 \\ \text{Bele} & 0 & 0 & 0 & 0 \\ \text{Btau} & 0 & 0 & 0 & 0 \end{array} \right)$$

Table 5: Partial input covariance between measurements. Error source #1: Sys1. Values /100M are displayed.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 0 & 0 & 0 & 0 \\ \text{Atau} & 0 & 9.00 & 0 & 0 \\ \text{Bele} & 0 & 0 & 0 & 0 \\ \text{Btau} & 0 & 0 & 0 & 0 \end{array} \right)$$

Table 6: Partial input covariance between measurements. Error source #2: Sys2. Values /100M are displayed.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 1.00 & 0 & -0.45 & 0 \\ \text{Atau} & 0 & 0 & 0 & 0 \\ \text{Bele} & -0.45 & 0 & 9.00 & 0 \\ \text{Btau} & 0 & 0 & 0 & 0 \end{array} \right)$$

Table 7: Partial input covariance between measurements. Error source #3: Sys3. Values /100M are displayed.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 0 & 0 & 0 & 0 \\ \text{Atau} & 0 & 0 & 0 & 0 \\ \text{Bele} & 0 & 0 & 0 & 0 \\ \text{Btau} & 0 & 0 & 0 & 9.00 \end{array} \right)$$

Table 8: Partial input covariance between measurements. Error source #4: Sys4. Values /100M are displayed.

## 2 Modified correlations.

### 2.1 Zero correlations.

| Measurements        |              | CVW <sub>ele</sub> /% | CVW <sub>tau</sub> /% | Stat | Sys1 | Sys2 | Sys3 | Sys4 |
|---------------------|--------------|-----------------------|-----------------------|------|------|------|------|------|
| Aele                | 10.50 ± 1.00 | 90.00                 | 0                     | 0    | 0    | 0    | 1.00 | 0    |
| Bele                | 13.50 ± 3.00 | 10.00                 | 0                     | 0    | 0    | 0    | 3.00 | 0    |
| BLUE <sub>ele</sub> | 10.80 ± 0.95 | 100.00                | 0                     | 0    | 0    | 0    | 0.95 | 0    |

| Measurements        |              | CVW <sub>ele</sub> /% | CVW <sub>tau</sub> /% | Stat | Sys1 | Sys2 | Sys3 | Sys4 |
|---------------------|--------------|-----------------------|-----------------------|------|------|------|------|------|
| Atau                | 9.50 ± 3.00  | 0                     | 50.00                 | 0    | 0    | 3.00 | 0    | 0    |
| Btau                | 14.00 ± 3.00 | 0                     | 50.00                 | 0    | 0    | 0    | 0    | 3.00 |
| BLUE <sub>tau</sub> | 11.75 ± 2.12 | 0                     | 100.00                | 0    | 0    | 1.50 | 0    | 1.50 |

Table 9: BLUE's of the combination ( $\chi^2/\text{ndof} = 2.02/2$ ). Values /10000 are displayed. For each input measurement  $i$ , the central value weight CVW or  $\lambda_i^\alpha$  with which that measurement contributes to the BLUE for observable  $\alpha$  is listed.

$$\left( \begin{array}{c|cc} & \text{ele} & \text{tau} \\ \hline \text{ele} & 1.00 & 0 \\ \text{tau} & 0 & 1.00 \end{array} \right)$$

Table 10: Correlations between the BLUE's.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 1.00 & 0 & 0 & 0 \\ \text{Atau} & 0 & 9.00 & 0 & 0 \\ \text{Bele} & 0 & 0 & 9.00 & 0 \\ \text{Btau} & 0 & 0 & 0 & 9.00 \end{array} \right)$$

Table 11: Full input covariance between measurements (summed over error sources). Values /100M are displayed.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 0 & 0 & 0 & 0 \\ \text{Atau} & 0 & 0 & 0 & 0 \\ \text{Bele} & 0 & 0 & 0 & 0 \\ \text{Btau} & 0 & 0 & 0 & 0 \end{array} \right)$$

Table 12: Partial input covariance between measurements. Error source #0: Stat. Values /100M are displayed.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 0 & 0 & 0 & 0 \\ \text{Atau} & 0 & 0 & 0 & 0 \\ \text{Bele} & 0 & 0 & 0 & 0 \\ \text{Btau} & 0 & 0 & 0 & 0 \end{array} \right)$$

Table 13: Partial input covariance between measurements. Error source #1: Sys1. Values /100M are displayed.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 0 & 0 & 0 & 0 \\ \text{Atau} & 0 & 9.00 & 0 & 0 \\ \text{Bele} & 0 & 0 & 0 & 0 \\ \text{Btau} & 0 & 0 & 0 & 0 \end{array} \right)$$

Table 14: Partial input covariance between measurements. Error source #2: Sys2. Values /100M are displayed.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 1.00 & 0 & 0 & 0 \\ \text{Atau} & 0 & 0 & 0 & 0 \\ \text{Bele} & 0 & 0 & 9.00 & 0 \\ \text{Btau} & 0 & 0 & 0 & 0 \end{array} \right)$$

Table 15: Partial input covariance between measurements. Error source #3: Sys3. Values /100M are displayed.

$$\left( \begin{array}{c|cccc} & \text{Aele} & \text{Atau} & \text{Bele} & \text{Btau} \\ \hline \text{Aele} & 0 & 0 & 0 & 0 \\ \text{Atau} & 0 & 0 & 0 & 0 \\ \text{Bele} & 0 & 0 & 0 & 0 \\ \text{Btau} & 0 & 0 & 0 & 9.00 \end{array} \right)$$

Table 16: Partial input covariance between measurements. Error source #4: Sys4. Values /100M are displayed.

## 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 "W branching ratio Ex2m15"
15
16 # The next line must have 2 fields: 'NOBS' and the number of observables.
17 NOBS 2
18
19 # The next line must have 2 fields: 'NMEA' and the number of measurements.
20 NMEA 4
21
22 # The next line must have 2 fields: 'NERR' and the number of error sources.
23 NERR 5
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    Aele    Atau    Bele    Btau
37 OBSNAME     ele     tau     ele     tau
38 MEAVAL  105000  95000  135000  140000
39 Stat      0        0        0        0
40 Sys1      0        0        0        0
41 Sys2      0    30000    0        0
42 Sys3    10000      0    30000    0
43 Sys4      0        0        0    30000
44
45 # The next NMEA*(NMEA-1)/2+1 rows must have NERR+2 fields in this format:
46 # - in the 1st line: 'CMEA1' 'CMEA2' (correlations between 2 measurements)
47 #   followed by the NERR error source names in the same order used above;
48 # - in each of the NMEA*(NMEA-1)/2 last lines: the names of two distinct
49 #   measurements followed by the NERR correlations between the partial

```

```
50 # errors on the two measurements due to corresponding error source.
51 # Measurements must appear in the same order listed above.
52 CMEA1 CMEA2 Stat Sys1 Sys2 Sys3 Sys4
53 Ae1e A1au 0 0 0 0 0
54 Ae1e Be1e 0 0 0 -.15 0
55 Ae1e B1au 0 0 0 0 0
56 A1au Be1e 0 0 0 0 0
57 A1au B1au 0 0 0 -.15 0
58 Be1e B1au 0 0 0 0 0
```

Input data file: Ex2\_m15.bfin.