Define:
ltn, ltp = live times for n, p helicities;
b2n, b2p = Beta2 triggers for n, p helicities;
h, hn = scaler counts for all (510), n (538) helicities.

```
> ltn:=b2n/hn;
```

$$ltn := \frac{b2n}{hn}$$

p helicity counts are c*h -hn = 0.985*h - hn

```
> ltp:=b2p/(c*h-hn);
```

$$ltp := \frac{b2p}{c\,h - hn}$$

```
> Alt:= (ltn-ltp)/(ltn+ltp);
```

$$Alt := \frac{\frac{b2n}{hn} - \frac{b2p}{c\,h - hn}}{\frac{b2n}{hn} + \frac{b2p}{c\,h - hn}}$$

```
> simplify(");
```

$$\frac{b2n\,c\,h - b2n\,hn - b2p\,hn}{b2n\,c\,h - b2n\,hn + b2p\,hn}$$

```
> Alt_b2n:=simplify(diff(Alt,b2n));
```

$$Alt\_b2n := 2\,\frac{b2p\,(c\,h - hn)\,hn}{(b2n\,c\,h - b2n\,hn + b2p\,hn)^2}$$

```
> Alt_b2p:=simplify(diff(Alt,b2p));
```

$$Alt\_b2p := -2\,\frac{b2n\,(c\,h - hn)\,hn}{(b2n\,c\,h - b2n\,hn + b2p\,hn)^2}$$

```
> Alt_h:=simplify(diff(Alt,h));
```

$$Alt\_h := 2\,\frac{b2n\,hn\,c\,b2p}{(b2n\,c\,h - b2n\,hn + b2p\,hn)^2}$$

```
> Alt_hn:=simplify(diff(Alt,hn));
```

$$Alt\_hn := -2\,\frac{b2p\,h\,c\,b2n}{(b2n\,c\,h - b2n\,hn + b2p\,hn)^2}$$

b2n, b2p, h, hn are counts from engine or scalers (h=510, hn =538), so their errors squared are just b2n, etc. counts.

```
> dAlt:=sqrt(Alt_b2n^2*b2n+Alt_b2p^2*b2p+Alt_h^ 2*h+Alt_hn^2*hn);
```

$$dAlt := 2\Big(\frac{b2p^2\,(c\,h - hn)^2\,hn^2\,b2n}{\%1^4} + \frac{b2n^2\,(c\,h - hn)^2\,hn^2\,b2p}{\%1^4} + \frac{b2n^2\,hn^2\,c^2\,b2p^2\,h}{\%1^4} + \frac{b2p^2\,h^2\,c^2\,b2n^2\,hn}{\%1^4}\Big)^{1/2}$$

$$\%1 := b2n\,c\,h - b2n\,hn + b2p\,hn$$

```
> dAlt2:=collect(dAlt,distributed,factor);
```

$$dAlt2 := 2(b2p\,hn\,b2n(b2p\,hn\,c^2\,h^2 - 2\,b2p\,hn^2\,c\,h + b2p\,hn^3 + b2n\,hn\,c^2\,h^2 - 2\,b2n\,hn^2\,c\,h + b2n\,hn^3 + b2n\,hn\,c^2\,b2p\,h + b2p\,h^2\,c^2\,b2n) \Big/ (b2n\,c\,h - b2n\,hn + b2p\,hn)^4)^{1/2}$$

```
> dAlt2_73041:=subs(b2p=360650,b2n=366615,h=792 012,hn=392716,c=0.985,dAlt2);
evalf(dAlt2_73041);
```

$$dAlt2\_73041 := .1004215685\,10^{-10}\sqrt{360650}\sqrt{366615}\sqrt{392716}$$

$$.002288307486$$

```
> Alt_73041:=subs(b2p=360650,b2n=366615,h=79201 2,hn=392716,c=0.985,Alt);
```

$$Alt\_73041 := .001408086213$$