Pensieve Header: A failed attempt to solve the two F equations with analytic hair using Full Scattering, where F is written as an exponential.

Ouch! f1 and f2 were treated as constants rather than functions!

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\ScatterAndGlow"];
<< ScatterAndGlow-090103.m

F = S[Exp[-1 / 4 Ar[2, 1] + 1 / 4 Ar[1, 2] + Y[1, 2, 1, AH[f1]] + Y[1, 2, 2, AH[f2]]]]
```

$$
\begin{aligned}
&S\Big[Ar[0,1] \to Ar[0,1] + \\
&\quad Y\Big[0,1,1,AH\Big[\left(e^{-\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\left(-1+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\right)^2\right. \\
&\qquad \left.(-1+4\,f1\,x[1])\,x[2]\,(-1+4\,f2\,x[2])\right)\Big/\,(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2\Big]\Big] + \\
&\quad Y\Big[0,1,2,AH\Big[\left(e^{-\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\left(-1+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\right)\right. \\
&\qquad (-1+4\,f2\,x[2])\left(x[1]^2+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,x[1]^2-\right. \\
&\qquad 2\,x[1]\,x[2]-2\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,x[1]\,x[2]+ \\
&\qquad 8\,f1\,x[1]^2\,x[2]+8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,x[1]^2\,x[2]- \\
&\qquad 8\,f2\,x[1]^2\,x[2]-8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f2\,x[1]^2\,x[2]+ \\
&\qquad x[2]^2+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,x[2]^2-8\,f1\,x[1]\,x[2]^2- \\
&\qquad 8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,x[1]\,x[2]^2+8\,f2\,x[1]\,x[2]^2+ \\
&\qquad 8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f2\,x[1]\,x[2]^2+16\,f1^2\,x[1]^2\,x[2]^2+ \\
&\qquad 16\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1^2\,x[1]^2\,x[2]^2-32\,f1\,f2\,x[1]^2\,x[2]^2- \\
&\qquad 32\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,f2\,x[1]^2\,x[2]^2+16\,f2^2\,x[1]^2\,x[2]^2+ \\
&\qquad 16\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f2^2\,x[1]^2\,x[2]^2+x[1] \\
&\qquad \sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}} \\
&\qquad x[1]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+x[2] \\
&\qquad \sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}} \\
&\qquad x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-4\,f1\,x[1]\,x[2]
\end{aligned}
$$

$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+4\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}$$
$$f1\,x[1]\,x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-4\,f2\,x[1]\,x[2]$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+4\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}$$
$$f2\,x[1]\,x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}\Big)\Big)\Big/$$
$$\Big(2\,(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}\Big)\Big]\Big]+$$
$$Y\Big[0,\,2,\,1,\,AH\Big[-\Big(e^{-\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\Big(-1+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\Big)$$
$$(-1+4\,f1\,x[1])\Big(-x[1]^2-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,x[1]^2+$$
$$2\,x[1]\,x[2]+2\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,x[1]\,x[2]-$$
$$8\,f1\,x[1]^2\,x[2]-8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,x[1]^2\,x[2]+$$
$$8\,f2\,x[1]^2\,x[2]+8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f2\,x[1]^2\,x[2]-$$
$$x[2]^2-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,x[2]^2+8\,f1\,x[1]\,x[2]^2+$$
$$8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,x[1]\,x[2]^2-8\,f2\,x[1]\,x[2]^2-$$
$$8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f2\,x[1]\,x[2]^2-16\,f1^2\,x[1]^2\,x[2]^2-$$
$$16\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1^2\,x[1]^2\,x[2]^2+32\,f1\,f2\,x[1]^2\,x[2]^2+$$
$$32\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,f2\,x[1]^2\,x[2]^2-16\,f2^2\,x[1]^2\,x[2]^2-$$
$$16\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f2^2\,x[1]^2\,x[2]^2+x[1]$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}$$
$$x[1]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+x[2]$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}$$
$$x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-$$
$$4\,f1\,x[1]\,x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+$$
$$4\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,x[1]\,x[2]$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-$$
$$4\,f2\,x[1]\,x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+$$

$$4\, e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\, f2\, x[1]\, x[2]$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}\Big)\Big)\Big/$$
$$\Big(2\,(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}\Big)\Big]\Big] +$$
$$Y\Big[0,\ 2,\ 2,\ AH\Big[-\Big(e^{-\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ \Big(-1+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\Big)^2$$
$$x[1]\,(-1+4\,f1\,x[1])\,(-1+4\,f2\,x[2])\Big)\Big/$$
$$(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2\Big]\Big],$$
$$Ar[0,\ 2]\to Ar[0,\ 2]+Y\Big[0,\ 1,\ 1,\ AH\Big[-\Big(e^{-\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}$$
$$\Big(-1+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\Big)^2\,(-1+4\,f1\,x[1])\,x[2]\,(-1+4\,f2\,x[2])\Big)\Big/$$
$$(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2\Big]\Big] +$$
$$Y\Big[0,\ 1,\ 2,\ AH\Big[-\Big(e^{-\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ \Big(-1+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\Big)$$
$$(-1+4\,f2\,x[2])\ \Big(x[1]^2+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ x[1]^2 -$$
$$2\,x[1]\,x[2]-2\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ x[1]\,x[2] +$$
$$8\,f1\,x[1]^2\,x[2]+8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ f1\,x[1]^2\,x[2] -$$
$$8\,f2\,x[1]^2\,x[2]-8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ f2\,x[1]^2\,x[2] +$$
$$x[2]^2+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ x[2]^2-8\,f1\,x[1]\,x[2]^2 -$$
$$8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ f1\,x[1]\,x[2]^2+8\,f2\,x[1]\,x[2]^2 +$$
$$8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ f2\,x[1]\,x[2]^2+16\,f1^2\,x[1]^2\,x[2]^2 +$$
$$16\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ f1^2\,x[1]^2\,x[2]^2-32\,f1\,f2\,x[1]^2\,x[2]^2 -$$
$$32\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ f1\,f2\,x[1]^2\,x[2]^2+16\,f2^2\,x[1]^2\,x[2]^2 +$$
$$16\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\ f2^2\,x[1]^2\,x[2]^2+x[1]$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}$$

$$
\begin{aligned}
&x[1]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+x[2]\\
&\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\\
&x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-\\
&4\,f1\,x[1]\,x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+\\
&4\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,x[1]\,x[2]\\
&\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-\\
&4\,f2\,x[1]\,x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+\\
&4\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f2\,x[1]\,x[2]\\
&\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}\Big)\Big)\Big/\\
&\Big(2\,(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2\\
&\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}\Big)\Big]\Big]+\\
&Y\Big[0,\,2,\,1,\,AH\Big[\Big(e^{-\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\Big(-1+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\Big)\\
&(-1+4\,f1\,x[1])\Big(-x[1]^2-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,x[1]^2+\\
&2\,x[1]\,x[2]+2\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,x[1]\,x[2]-\\
&8\,f1\,x[1]^2\,x[2]-8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,x[1]^2\,x[2]+\\
&8\,f2\,x[1]^2\,x[2]+8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f2\,x[1]^2\,x[2]-\\
&x[2]^2-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,x[2]^2+8\,f1\,x[1]\,x[2]^2+\\
&8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,x[1]\,x[2]^2-8\,f2\,x[1]\,x[2]^2-\\
&8\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f2\,x[1]\,x[2]^2-16\,f1^2\,x[1]^2\,x[2]^2-\\
&16\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1^2\,x[1]^2\,x[2]^2+32\,f1\,f2\,x[1]^2\,x[2]^2+\\
&32\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f1\,f2\,x[1]^2\,x[2]^2-16\,f2^2\,x[1]^2\,x[2]^2-\\
&16\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\,f2^2\,x[1]^2\,x[2]^2+x[1]\\
&\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\\
&x[1]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+x[2]\\
&\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}
\end{aligned}
$$

$$x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-4\,f1\,x[1]\,x[2]$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+4\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}$$
$$f1\,x[1]\,x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}-4\,f2\,x[1]\,x[2]$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}+4\,e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}$$
$$f2\,x[1]\,x[2]\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}\Big)\Big)\Big/$$
$$\Big(2\,(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2$$
$$\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}\Big)\Big]\Big]+$$
$$Y\Big[0,\,2,\,2,\,AH\Big[\Big(e^{-\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\Big(-1+e^{\frac{1}{4}\sqrt{(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2}}\Big)^2$$
$$x[1]\,(-1+4\,f1\,x[1])\,(-1+4\,f2\,x[2])\Big)\Big/$$
$$(x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2])^2\Big]\Big],$$
$$Ar[1,\,0]\to Ar[1,\,0]+Y\Big[1,\,2,$$
$$0,$$
$$AH\Big[\frac{e^{-\frac{x[2]}{4}-f2\,x[1]\,x[2]}\Big(-e^{\frac{x[1]}{4}+f1\,x[1]\,x[2]}+e^{\frac{x[2]}{4}+f2\,x[1]\,x[2]}\Big)\,(-1+4\,f1\,x[1])}{x[1]-x[2]+4\,f1\,x[1]\,x[2]-4\,f2\,x[1]\,x[2]}\Big]\Big],\,Ar[$$
$$2,\,0]\to Ar[2,$$
$$0]+$$
$$Y\Big[$$
$$1,$$
$$2,$$
$$0,$$
$$AH\Big[-\frac{e^{-\frac{x[2]}{4}-f2\,x[1]\,x[2]}\Big(-e^{\frac{x[1]}{4}+f1\,x[1]\,x[2]}+e^{\frac{x[2]}{4}+f2\,x[1]\,x[2]}\Big)\,(-1+4\,f2\,x[2])}{-x[1]+x[2]-4\,f1\,x[1]\,x[2]+4\,f2\,x[1]\,x[2]}\Big]\Big]\Big]$$

```
Short[
 F21 = S[Exp[-1 / 4 Ar[1, 2] + 1 / 4 Ar[2, 1] + Y[2, 1, 2, AH[f1]] + Y[2, 1, 1, AH[f2]]]]
]
```

```
S[ <<1>> ]
```

```
Short[lhs1 = Ar[3, 0] // S[Exp[Ar[1, 3] + Ar[2, 3]]] // F]
```

$$Ar[3,\,0]+Y\Big[1,\,2,\,0,\,AH\Big[-\frac{e^{-\text{<<1>>}-\text{<<1>>}}\,(\text{<<1>>})\,x[3]}{x[1]\,x[2]\,(\text{<<1>>})\,(\text{<<1>>})}\Big]\Big]+Y[\text{<<1>>}]+Y\Big[2,\,3,\,0,\,AH\Big[\frac{-1+e^{x[2]}}{x[2]}\Big]\Big]$$

```
Short[rhs1 = Ar[3, 0] // F // S[sigma[1, 3], sigma[2, 3]]]
```

$$\text{Ar}[3,0] + \text{Y}\left[1, 2, 0, \text{AH}\left[-\frac{\left(-1+e^{x\,\ll 1\gg\,\ll 1\gg}\right)\,\ll 1\gg\, x[3]}{x[1]\,x[2]}\right]\right] + \text{Y}\left[1, \ll 2\gg, \text{AH}\left[\frac{\ll 1\gg}{\ll 1\gg}\right]\right] + \text{Y}\left[2, 3, 0, \text{AH}\left[\frac{-1+e^{x[2]}}{x[2]}\right]\right]$$

```
lhs2 = Ar[1, 0] // F21 // S[sigma[1, 2]] // S[Exp[1 / 2 Ar[1, 1]]] // S[Exp[1 / 2 Ar[2, 2]]]
```

$$\text{Ar}[1,0] + \text{Y}\left[1, 2, 0, \text{AH}\left[-\left(e^{\frac{3x[1]}{4}-\text{f2}\,x[1]\,x[2]}\left(-e^{\frac{x[2]}{4}+\text{f1}\,x[1]\,x[2]} + e^{\frac{x[1]}{4}+\text{f2}\,x[1]\,x[2]}\right)(-1+4\,\text{f2}\,x[1])\right)\Big/ (-x[1]+x[2]+4\,\text{f1}\,x[1]\,x[2]-4\,\text{f2}\,x[1]\,x[2])\right]\right]$$

```
rhs2 = Ar[1, 0] // S[Exp[Expand[1 / 2 (Ar[1, 1] + Ar[1, 2] + Ar[2, 1] + Ar[2, 2])]]] // F
```

$$\begin{aligned}&\text{Ar}[1,0] + \\ &\text{Y}\left[1, 2, 0, \text{AH}\left[\left(e^{-\frac{x[2]}{4}-\text{f2}\,x[1]\,x[2]}\left(2\,e^{\frac{x[1]}{4}+\text{f1}\,x[1]\,x[2]}\,x[1] - e^{\frac{3x[1]}{4}+\frac{x[2]}{2}+\text{f1}\,x[1]\,x[2]}\,x[1] - e^{\frac{x[2]}{4}+\text{f2}\,x[1]\,x[2]}\,x[1] - \right.\right.\right.\\ &\quad 4\,e^{\frac{x[1]}{4}+\text{f1}\,x[1]\,x[2]}\,\text{f1}\,x[1]^2 + 4\,e^{\frac{x[2]}{4}+\text{f2}\,x[1]\,x[2]}\,\text{f1}\,x[1]^2 + e^{\frac{3x[1]}{4}+\frac{x[2]}{2}+\text{f1}\,x[1]\,x[2]}\,x[2] - \\ &\quad e^{\frac{x[2]}{4}+\text{f2}\,x[1]\,x[2]}\,x[2] - 4\,e^{\frac{3x[1]}{4}+\frac{x[2]}{2}+\text{f1}\,x[1]\,x[2]}\,\text{f1}\,x[1]\,x[2] + 4\,e^{\frac{x[2]}{4}+\text{f2}\,x[1]\,x[2]}\,\text{f1}\,x[1]\,x[2] - \\ &\quad \left.\left.\left.4\,e^{\frac{x[1]}{4}+\text{f1}\,x[1]\,x[2]}\,\text{f2}\,x[1]\,x[2] + 4\,e^{\frac{3x[1]}{4}+\frac{x[2]}{2}+\text{f1}\,x[1]\,x[2]}\,\text{f2}\,x[1]\,x[2]\right)\right)\Big/ \right.\\ &\left.\left.((x[1]+x[2])\,(x[1]-x[2]+4\,\text{f1}\,x[1]\,x[2]-4\,\text{f2}\,x[1]\,x[2]))\right]\right]\end{aligned}$$

The following was aborted after a day of computation:

```
sol = Solve[
  {
   Coefficient[lhs1, Y[1, 2, 0]] == Coefficient[rhs1, Y[1, 2, 0]],
   Coefficient[lhs2, Y[1, 2, 0]] == Coefficient[rhs2, Y[1, 2, 0]]
  },
  {f1, f2}
 ]
$Aborted
```

■ To do

- Print lhs1 and rhs1 in full.
- See if matters can be simplified by picking specific coefficients of or values for x[3].