- **Claim: When Metaclass I factorises into a double light cone, the null cone intersection is two lines.**
- **Define Lorentz null cones**

In[1]:=
$$AA = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & \frac{1}{2}\left(-D3+\sqrt{-4+D3^2}\right) & 0 \\ 0 & 0 & 0 & \frac{1}{2}\left(-D3+\sqrt{-4+D3^2}\right) \end{pmatrix};$$

$$BB = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & \frac{1}{2}\left(-D3-\sqrt{-4+D3^2}\right) & 0 \\ 0 & 0 & 0 & \frac{1}{2}\left(-D3-\sqrt{-4+D3^2}\right) \end{pmatrix};$$

- **Suppose v is a null vector for both Lorentz metrics**

In[3]:=
```
v = {a0, a1, a2, a3}
```

Out[3]=
```
{a0, a1, a2, a3}
```

In[4]:=
```
p0 = v.AA.v;
p1 = v.BB.v;
```

- **If p0 = 0 and p1 = 0, then it follows that p0-p1 = 0.**

In[6]:=
```
Simplify[p0 - p1]
```

Out[6]=
$$\left(a2^2 + a3^2\right)\sqrt{-4 + D3^2}$$

- **It follows that a2=a3=0**

In[7]:=
```
Simplify[(p0 + p1) /. {a2 → 0, a3 → 0}]
```

Out[7]=
$$2\left(a0^2 - a1^2\right)$$

- **It follows that a0= +/- a1**
- **Check**

In[8]:=
```
vec = {t, s, 0, 0};

vec.AA.vec
vec.BB.vec
```

Out[9]= $-s^2 + t^2$

Out[10]= $-s^2 + t^2$