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

In[1]:=
```
AAtrans = {{b1^2/ww, 0, 0, 0}, {0, -b1^2/ww, 0, 0}, {0, 0, -b1, 0}, {0, 0, 0, -b1}};
```

```
BBtrans = {{b1^2 (-2+ww)/ww^2, 2 b1^2/ww^2, 0, 0}, {2 b1^2/ww^2, -b1^2 (2+ww)/ww^2, 0, 0}, {0, 0, -b1, 0}, {0, 0, 0, -b1}};
```

- **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.AAtrans.v;
p1 = v.BBtrans.v;
```

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

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

Out[6]=
$$\frac{2\,(a0-a1)^2\,b1^2}{ww^2}$$

- **It follows that a0=a1**

In[7]:=
```
Simplify[{p0, p1} /. {a1 → a0}]
```

Out[7]=
$$\left\{-\left(a2^2+a3^2\right)\,b1,\ -\left(a2^2+a3^2\right)\,b1\right\}$$

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

In[8]:=
```
Simplify[{p0, p1} /. {a0 → a1, a2 → 0, a3 → 0}]
v /. {a0 → a1, a2 → 0, a3 → 0}
```

Out[8]=
```
{0, 0}
```

Out[9]=
```
{a1, a1, 0, 0}
```

- **Check**

In[10]:=
```
vec = {t, t, 0, 0};

Simplify[vec.AAtrans.vec]
Simplify[vec.BBtrans.vec]
```

Out[11]=
```
0
```

Out[12]=
```
0
```