

```
In[1]:= SetDirectory["~/KappaLib/"];
<< kappaLib-1.2.m
<< helper.m

Loading KappaLib v1.2

Loading helper.m..
```

■ Define Metaclass II

```
In[4]:= kappa = emMatrixToKappa [
  (
    a1 -b1 0 0 0 0
    b1 a1 0 0 0 0
    0 0 a2 0 0 -b2
    0 1 0 a1 b1 0
    1 0 0 -b1 a1 0
    0 0 b2 0 0 a2
  )
];
```

```
In[5]:= sub = {a2 → a1, b2 → b1};
kappa = kappa /. sub;;
```

```
In[7]:= emKappaToMatrix[kappa] // MatrixForm
```

Out[7]/MatrixForm=

$$\begin{pmatrix} a1 & -b1 & 0 & 0 & 0 & 0 \\ b1 & a1 & 0 & 0 & 0 & 0 \\ 0 & 0 & a1 & 0 & 0 & -b1 \\ 0 & 1 & 0 & a1 & b1 & 0 \\ 1 & 0 & 0 & -b1 & a1 & 0 \\ 0 & 0 & b1 & 0 & 0 & a1 \end{pmatrix}$$

■ Define A and metric g

```
In[8]:= Abivector = (
  (
    0 1 1 0
    -1 0 0 0
    -1 0 0 0
    0 0 0 0
  )
);
```

```
Metric = Inverse [
  (
    -1 0 0 b1
    0 -b1 0 0
    0 0 -b1 0
    b1 0 0 0
  )
];
```

$$C1 = -\frac{1/b1}{\text{SqrtAbsDetG}};$$

$$C2 = a1;$$

$$\text{rho} = 1/2;$$

■ Formulate equations that should be satisfied

```
In[13]:= kappaAlt = C1 emQMedium[SqrtAbsDetG, Inverse[Metric]] +
  emBiProduct[rho, Abivector, Abivector] + C2 emIdentityKappa[];
eqs = Union[Flatten[FullSimplify[kappa - kappaAlt]]]
```

Out[14]= {0}

■ Check that metric has a Lorentz signature

```
In[15]:= Det[Metric]
```

Out[15]= $-\frac{1}{b1^4}$

Extra: Alternative expression for metric and A

■ Define A and metric g

$$\text{In[16]:= Abivector} = \begin{pmatrix} 0 & 1 & -1 & 0 \\ -1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix};$$

$$\text{Metric} = \text{Inverse} \left[\begin{pmatrix} 1 & 0 & 0 & b1 \\ 0 & -b1 & 0 & 0 \\ 0 & 0 & -b1 & 0 \\ b1 & 0 & 0 & 0 \end{pmatrix} \right];$$

$$C1 = -\frac{1/b1}{\text{SqrtAbsDetG}};$$

$$C2 = a1;$$

$$\text{rho} = -1/2;$$

■ Formulate equations that should be satisfied

```
In[21]:= kappaAlt = C1 emQMedium[SqrtAbsDetG, Inverse[Metric]] +
emBiProduct[rho, Abivector, Abivector] + C2 emIdentityKappa[];
eqs = Union[Flatten[FullSimplify[kappa - kappaAlt]]]
```

Out[22]= {0}

■ Check that metric has a Lorentz signature

```
In[23]:= Det[Metric]
```

$$\text{Out[23]=} -\frac{1}{b1^4}$$