In[1]:=
```
ClearAll["Global`*"]
```

$$\eta = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix};$$

$$\text{pVec} = \begin{pmatrix} p \\ 0 \\ 0 \\ p \end{pmatrix};\ \text{pPrimVec} = \begin{pmatrix} p \\ 0 \\ 0 \\ -p \end{pmatrix};$$

$$\text{kPrimVec} = \begin{pmatrix} p \\ 0 \\ -\text{Sin}[\theta]\, p \\ -\text{Cos}[\theta]\, p \end{pmatrix};\ \text{kVec} = \begin{pmatrix} p \\ 0 \\ \text{Sin}[\theta]\, p \\ \text{Cos}[\theta]\, p \end{pmatrix};$$

```
u = ((pVec - kPrimVec)^T . η . (pVec - kPrimVec))[[1, 1]] // FullSimplify;
Print["u = ", u]
s = ((pVec + pPrimVec)^T . η . (pVec + pPrimVec))[[1, 1]] // FullSimplify;
Print["s = ", s]
t = ((pVec - kVec)^T . η . (pVec - kVec))[[1, 1]] // FullSimplify;
Print["t = ", t]
```

$u = -2\,p^2\,(1 + \text{Cos}[\theta])$

$s = 4\,p^2$

$t = 2\,p^2\,(-1 + \text{Cos}[\theta])$

In[11]:=
```
differentialCrossSection = (π α^2 / s) (u^2 (1/s + 1/t)^2 + (t/s)^2 + (s/t)^2) // FullSimplify;
Print["dσ/d(cos θ) =", differentialCrossSection]
```

$$\frac{d\sigma}{d(\cos\theta)} = \frac{\pi\,\alpha^2\,(7 + \text{Cos}[2\,\theta])^2}{32\,p^2\,(-1 + \text{Cos}[\theta])^2}$$