Non-Commutative T-Duality:

Classical T-Duality and Examples (Session 1 & 2)

General Theory of NC T-Duality & outlook (Session 3 & 4)

Classical Theory:

Space Time: (E, g)
manifold   metric

$S^1 \circlearrowright E$ Principle S^1-Bundle

$$\begin{array}{c} E \\ \downarrow S^1 \\ E/_{S^1} = B \end{array}$$

H-flux: $H \in \Omega^3(E)$ $dH = 0$ locally coordinate transformation ("Buscher Rules")
field equation

$[H] \in H^3_{dR}(E) \circlearrowleft \check{H}^3(H, \mathbb{Z})$

$(\hat{E}, \hat{g})$

$\hat{E} \xrightarrow{S^1} B$, dual H-flux $\hat{H} \in \Omega^3(\hat{E})$,
$d\hat{H} = 0$, $[\hat{H}] \in \operatorname{im}\left(H^3(\hat{E}, \mathbb{Z}) \hookrightarrow \check{H}^3_{dR}(\hat{E})\right)$

Note: 1) $H, \hat{H}$ have integral cohomology:

$$\check{H}^3(E, \mathbb{Z}) \cong [E, \underbrace{K(\mathbb{Z}, 3)}_{\text{Eilenberg-Maclane Space}}]$$ homotopy classes of maps

$$\pi_n(K(\mathbb{Z},3)) = \begin{cases} 0 & n = 0,1,2,4,5 \\ \mathbb{Z} & n = 3 \end{cases}$$
$$\| $$
$$[S^n, K(\mathbb{Z}, 3)]$$