Coherent expectation values: notions for codes

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I. the basic notions

- A vertex (x, y, z)

```
In[1]:=    vertex[{x_,y_,z_}]
```

- An edge e with $s(e) = (x_1, y_2, z_z)$ and $t(e) = (x_2, y_2, z_2)$

```
In[2]:=    DirectedEdge[{x1_,y1_,z1_},{x2_,y2_,z2_}]
```

- A holonomy operator $D^{\frac{1}{2}}_{ab}(n_e^{-1} h_e n_e)$

```
In[3]:=    holonomy[e_,a_,b_]
```

It should be noticed that, for computation, we use $n_e^{-1} h_e n_e$ rather than the holonomy h_e itself which is because

$$\langle \psi_{g_e} | n_e^{-1} h_e n_e | \psi_{g_e} \rangle = \langle h_e \rangle_{z_e} \tag{1.1}$$

- The flux operator $\prod_{\alpha \in \mathcal{I}} (p_s^\beta(e^+) - p_t^\beta(e^-)) D^\iota_{\beta\alpha}(n_e)$ with $v = s(e^+) = t(e^-)$

```
In[4]:=    P[v_,dir_,indP_]
```

where `dir_` is $1, 2, 3$ representing the direction of the edge e and `indP_` is $\mathcal{I}$, the set of the flux indices. Here we used the operator $(p_s^\beta(e^+) - p_t^\beta(e^-)) D^\iota_{\beta\alpha}(n_e)$ because of the same reason for the holonomy operator.

- The flux operator $\prod_{\alpha \in \mathcal{I}} (p_s^\beta(e^+) + p_t^\beta(e^-)) D^\iota_{\beta\alpha}(n_e)$ with $v = s(e^+) = t(e^-)$

```
In[5]:=    P[v_,dir_,indP_,1]
```

- The set of flux indices $\mathcal{I}_i$

```
In[6]:=    indP[i_,{dir_,m_}]
```

where `dir_` is the direction of the edge on which the indices are and `m_` is $|\mathcal{I}_i|$.

- The holonomy indices are denoted as `indh[__]` or `indhp[__]`

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