

$$\langle \{\}, \{X, Z\}, id, \{[a]\langle [b]f_n^C \langle X, Y \rangle, Z \rangle \approx? [b]\langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle\} \rangle$$

$$(\approx? [\mathbf{ab}]) \left| \right.$$

$$\langle \{\}, \{X, Z\}, id, \{ \langle [b]f_n^C \langle X, Y \rangle, Z \rangle \approx? \langle [b]f_n^C \langle \bar{b}, (ab).X \rangle, (ab).Z \rangle, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle \} \rangle$$

$$(\approx? \mathbf{pair}) \left| \right.$$

$$\langle \{\}, \{X, Z\}, id, \{ [b]f_n^C \langle X, Y \rangle \approx? [b]f_n^C \langle \bar{b}, (ab).X \rangle, Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle \} \rangle$$

$$(\approx? [\mathbf{aa}]) \left| \right.$$

$$\langle \{\}, \{X, Z\}, id, \{ f_n^C \langle X, Y \rangle \approx? f_n^C \langle \bar{b}, (ab).X \rangle, Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle \} \rangle$$

$$(\approx? \mathbf{C})$$

$$\langle \{\}, \{X, Z\}, id, \{ X \approx? \bar{b}, Y \approx? (ab).X, Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle \} \rangle$$

$$(\perp)$$

$$\langle \{\}, \{X, Z\}, id, \{ X \approx? (ab).X, Y \approx? \bar{b}, Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle \} \rangle$$

$$(\approx? \mathbf{inv}) \left| \right.$$

$$\langle \{\}, \{X, Z\}, id, \{ Y \approx? \bar{b}, Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle, (ab).X \approx? X \} \rangle$$

$$(\approx? \mathbf{inst}) \left| \right.$$

$$\langle \{\}, \{X, Z\}, Y/\bar{b}, \{ Z \approx? (ab).Z, a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle, (ab).X \approx? X \} \rangle$$

$$(\approx? \mathbf{inv}) \left| \right.$$

$$\langle \{\}, \{X, Z\}, Y/\bar{b}, \{ a \#? \langle [a]f_n^C \langle \bar{a}, X \rangle, Z \rangle, (ab).X \approx? X, (ab).Z \approx? Z \} \rangle$$

$$(\#? \mathbf{pair}) \left| \right.$$

$$\langle \{\}, \{X, Z\}, Y/\bar{b}, \{ a \#? [a]f_n^C \langle \bar{a}, X \rangle, a \#? Z, (ab).X \approx? X, (ab).Z \approx? Z \} \rangle$$

$$(\#? \mathbf{a[a]}) \left| \right.$$

$$\langle \{\}, \{X, Z\}, Y/\bar{b}, \{ a \#? Z, (ab).X \approx? X, (ab).Z \approx? Z \} \rangle$$

$$(\#? \mathbf{var}) \left| \right.$$

$$\langle \{a\#Z\}, \{X, Z\}, Y/\bar{b}, \{ (ab).X \approx? X, (ab).Z \approx? Z \} \rangle$$

$$(\mu_{\mathbf{fp}}) \left| \right.$$

$$\langle \{a\#X, b\#X, a\#Z\}, \{X, Z\}, Y/\bar{b}, \{ (ab).Z \approx? Z \} \rangle$$

$$(\mu_{\mathbf{fp}}) \left| \right.$$

$$\langle \{b\#Z, a\#X, b\#X, a\#Z\}, \{X, Z\}, Y/\bar{b}, \{\} \rangle$$

$$(\top)$$