Assume:

$$ux = x_l + x_h * 2^{64}$$
$$uy = y_l + y_h * 2^{64}$$

then:

$$ux * uy = x_l * y_l + (x_l * y_h + x_h * y_l) * 2^{64} + x_h * y_h * 2^{128}$$

Since 2^{128} overflows and don't care. So:

$$ux * uy = x_l * y_l + (x_l * y_h + x_h * y_l) * 2^{64}$$