dual quat * point

$= (q.w + q.e_{12} + q.e_{31} + q.e_{23} + q.e_{01} + q.e_{02} + q.e_{03} + q.e_{0123})$

$\times (p.e_{032} + p.e_{013} + p.e_{021} + p.e_{123})$

$= (q.w)(p.e_{032})\,e_{032} + (q.w)(p.e_{013})\,e_{013} + (q.w)(p.e_{021})\,e_{021} + (q.w)(p.e_{123})\,e_{123}$

$+ (q.e_{12})(p.e_{032})(-e_{013}) + (q.e_{12})(p.e_{013})\,e_{032}$

$+ (q.e_{12})(p.e_{021})\,e_0 + (q.e_{12})(p.e_{123})(-e_3)$

$+ (q.e_{31})(p.e_{032})\,e_{021} + (q.e_{31})(p.e_{013})\,e_0$

$+ (q.e_{31})(p.e_{021})(-e_{032}) + (q.e_{31})(p.e_{123})(-e_2)$

$+ (q.e_{23})(p.e_{032})\,e_0 + (q.e_{23})(p.e_{013})(-e_{021})$

$+ (q.e_{23})(p.e_{021})\,e_{013} + (q.e_{23})(p.e_{123})(-e_1)$

$+ (q.e_{01})(p.e_{123})(-e_{032}) + (q.e_{02})(p.e_{123})(-e_{013})$

$+ (q.e_{03})(p.e_{123})(-e_{021}) + (q.e_{0123})(p.e_{123})(-e_0)$

~~FEAT~~ ~~$(q.w)[p.e_{032} + p.e_{013} + p.e_{021} + p.e_{125}]$~~

~~PART~~ NONE

e_0 PART: $(q.e_{12})(p.e_{021}) + (q.e_{31})(p.e_{013}) + (q.e_{23})(p.e_{032}) + (q.e_{0123})(p.e_{123})$

e_1: $-(q.e_{23})(p.e_{123})$

e_2: $-(q.e_{31})(p.e_{123})$

e_3: $-(q.e_{12})(p.e_{123})$

e_{032} PART: $(q.e_{12})(p.e_{013}) - (q.e_{31})(p.e_{021}) - (q.e_{01})(p.e_{123}) + (q.w)(p.e_{032})$

e_{013} PART: $-(q.e_{12})(p.e_{032}) + (q.e_{23})(p.e_{021}) - (q.e_{02})(p.e_{123}) + (q.w)(p.e_{013})$

e_{021} PART: $(q.e_{31})(p.e_{032}) - (q.e_{23})(p.e_{013}) - (q.e_{03})(p.e_{123}) + (q.w)(p.e_{021})$

e_{123} PART: $(q.w)(p.e_{123})$