

```

gPair[fs_, w_] :=
gPair[fs, w] =
Collect[ZipJoin@@Table[{pα, p̄α, xα, x̄α}, {α, w}] [
(Times @@ (V /@ fs))
Exp[Sum[gα,β (πα + π̄α) (ξβ + ξ̄β), {α, w}, {β, w}] - Sum[ξ̄α πα, {α, w}]]],
g__, Factor]

```