In[•]:=
```
Corr[n_] = (-1)^(n+1) 1/z$r^(n+1)
  Integrate[ψ^n Exp[-2 ψ d/z$r], {ψ, 0, ∞}, Assumptions → {Element[n, Integers],
    n ⩾ 0, Element[d, Reals], d > 0, Element[z$r, Reals], z$r > 0}]
```

Out[•]=
$$(-1)^{1+n}\, 2^{-1-n}\, z\$r^{-1-n} \left(\frac{z\$r}{d}\right)^{1+n} \text{Gamma}[1+n]$$

In[•]:=
```
Corr[0]
```

Out[•]=
$$-\frac{1}{2\,d}$$

In[•]:=
```
Corr[1]
```

Out[•]=
$$\frac{1}{4\,d^2}$$

In[•]:=
```
Corr[2]
```

Out[•]=
$$-\frac{1}{4\,d^3}$$

```
γ$perp = cap[1]^2 Corr[0] + 2 cap[0] × cap[1] × Corr[1] + cap[0]^2 Corr[2] // Expand
```

Out[•]=
$$-\frac{\text{cap}[0]^2}{4\,d^3} + \frac{\text{cap}[0] \times \text{cap}[1]}{2\,d^2} - \frac{\text{cap}[1]^2}{2\,d}$$