In[1]:=
```
ClearAll["Global`*"]
```

$$V = -\frac{1}{2}\mu^2\left(\pi^2 + (v+\sigma)^2\right) + \frac{\lambda}{4}\left(\pi^2 + (v+\sigma)^2\right)^2 - a\,(v+\sigma);$$

$$V /. \left\{v \to \frac{\mu}{\sqrt{\lambda}} + \frac{a}{2\,\mu^2}\right\} // \text{FullSimplify} // \text{Expand}$$

Out[3]=
$$\frac{\pi^4\,\lambda}{4} + \frac{a^4\,\lambda}{64\,\mu^8} + \frac{a^3\,\sqrt{\lambda}}{8\,\mu^5} + \frac{a^2\,\pi^2\,\lambda}{8\,\mu^4} - \frac{a^2}{4\,\mu^2} + \frac{a\,\pi^2\,\sqrt{\lambda}}{2\,\mu} - \frac{a\,\mu}{\sqrt{\lambda}} - \frac{\mu^4}{4\,\lambda} + \frac{a^3\,\lambda\,\sigma}{8\,\mu^6} + \frac{3\,a^2\,\sqrt{\lambda}\;\sigma}{4\,\mu^3} +$$
$$\frac{a\,\pi^2\,\lambda\,\sigma}{2\,\mu^2} + \pi^2\,\sqrt{\lambda}\;\mu\,\sigma + \frac{1}{2}\,\pi^2\,\lambda\,\sigma^2 + \frac{3\,a^2\,\lambda\,\sigma^2}{8\,\mu^4} + \frac{3\,a\,\sqrt{\lambda}\;\sigma^2}{2\,\mu} + \mu^2\,\sigma^2 + \frac{a\,\lambda\,\sigma^3}{2\,\mu^2} + \sqrt{\lambda}\;\mu\,\sigma^3 + \frac{\lambda\,\sigma^4}{4}$$