③

$$= -\frac{4}{3}\pi + \frac{2^6}{3}\pi^3 \cdot 2\int_0^{\arcsin(\alpha)} \cos^4 s\, ds$$

$$\sin\alpha = \frac{2\pi}{(8\pi^2)^{3/2}} = 2^{-7/2}\pi^{-2} < 1 < \pi/2$$

$$\int_0^{\arcsin\alpha}\cos^4 s\, ds \underset{\text{per parti}}{=} \Big[\sin s\cos^3 s\Big]_0^{\arcsin\alpha} + 3\int_0^{\arcsin\alpha}\cos^2 s\, \underbrace{\sin^2 s}_{1-\cos^2 s}$$

$$\Rightarrow \int_0^{\arcsin\alpha}\cos^4 s\, ds = \frac{1}{4}\left(\alpha(1-\alpha^2)^{3/2} + 3\int_0^{\arcsin\alpha}\underbrace{\cos^2 s}_{\frac{1+\cos(2s)}{2}}\, ds\right)$$

$$= \frac{\alpha}{4}(1-\alpha^2)^{3/2} + \frac{3}{4}\left[\frac{s}{2} + \frac{1}{4}\sin(2s)\right]_0^{\arcsin\alpha} =$$

$$= \frac{\alpha}{4}(1-\alpha^2)^{3/2} + \frac{3}{8}\arcsin\alpha + \frac{3}{\cancel{16}_{8}}\cancel{2}\,\alpha\sqrt{1-\alpha^2}$$

$$\Rightarrow I = -\frac{4}{3}\pi + \frac{2^5}{3}\pi^3\,\alpha(1-\alpha^2)^{3/2} +$$