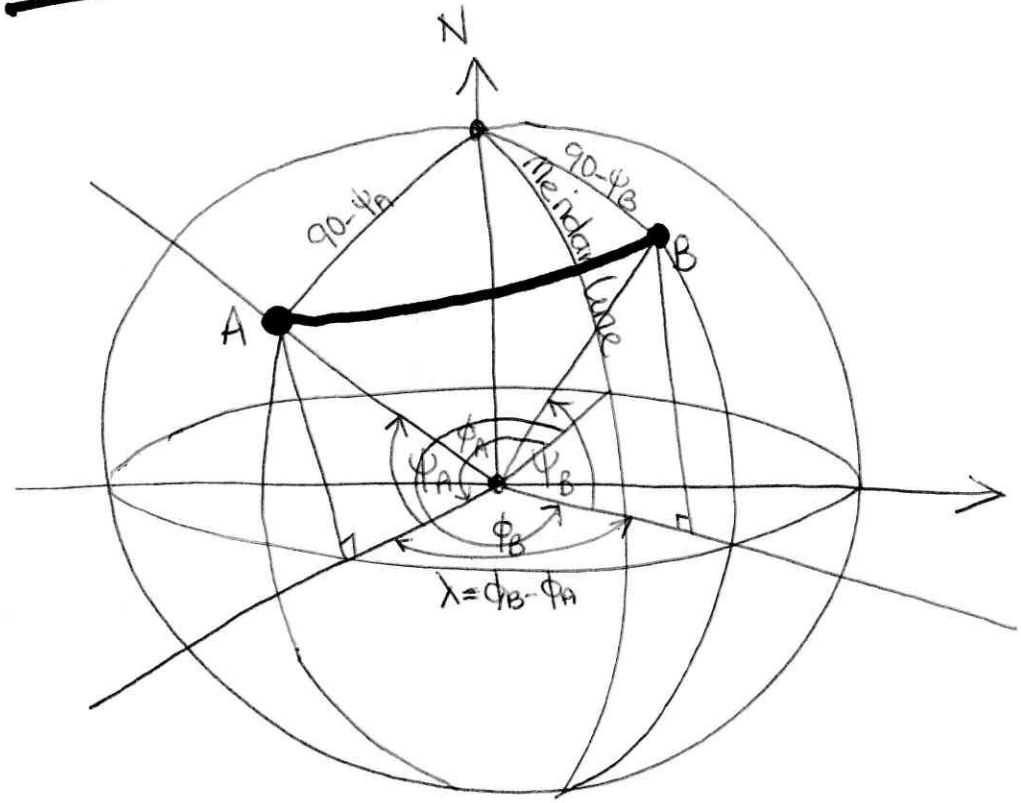
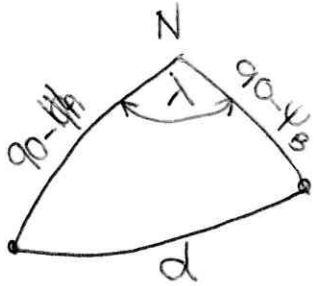
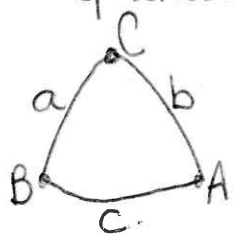
Distance AB





$$d = 2\tan^{-1}\left(\frac{\sqrt{x}}{\sqrt{1-x}}\right) \times \text{radius of sphere}$$

Spherical laws of Cosines



$$\cos(c) = \cos(a)\cos(b) + \sin(a)\sin(b)\cos(C)$$

$$\cos(d) = \cos(90-\psi_A)\cos(90-\psi_B) + \sin(90-\psi_A)\sin(90-\psi_B)\cos(\lambda)$$

$\sin\psi_A$ $\sin\psi_B$ $\cos\psi_A$ $\cos\psi_B$

$\cos(\lambda) = 1-2\sin^2\left(\frac{\lambda}{2}\right)$ $\qquad \cos(A-B) = \sin A\sin B + \cos A\cos B$

$\cos(d) = 1-2\sin^2\left(\frac{d}{2}\right)$ $\qquad \cos^2(A) + \sin^2(A) = 1$

$$1-2\sin^2\left(\frac{d}{2}\right) = \sin\psi_A\sin\psi_B + \cos\psi_A\cos\psi_B\left(1-2\sin^2\left(\frac{\lambda}{2}\right)\right)$$

$$1-2\sin^2\left(\frac{d}{2}\right) = \cos(\psi_A-\psi_B) - 2\cos\psi_A\cos\psi_B\sin^2\left(\frac{\lambda}{2}\right)$$

$\psi_A - \psi_B = d\psi$

$$1-2\sin^2\left(\frac{d}{2}\right) = 1-2\sin^2\left(\frac{d\psi}{2}\right) - 2\cos\psi_A\cos\psi_B\sin^2\left(\frac{\lambda}{2}\right)$$

$$\sin^2\left(\frac{d}{2}\right) = \sin^2\left(\frac{d\psi}{2}\right) + \cos\psi_A\cos\psi_B\sin^2\left(\frac{\lambda}{2}\right)$$

x

$$\tan\left(\frac{d}{2}\right) = \frac{\sin(d/2)}{\cos(d/2)} = \frac{\sqrt{x}}{\sqrt{1-x}}$$