$$2\pi\nu' = 2\pi\nu - \left(\frac{2\pi}{\lambda}\right)v$$

$$\sqrt{1 - v^2/c^2}$$

$$\nu' = \frac{\nu - \frac{v}{\lambda}}{\sqrt{1 - v^2/c^2}}$$

$$\left[\text{As } c = \nu\lambda \quad \frac{1}{\lambda} = \frac{\nu}{c}\right.$$

$$\nu' = \frac{\nu - \nu \times \frac{v}{c}}{\sqrt{1 - v^2/c^2}}$$

$$\nu' = \frac{\nu\left(1 - \frac{v}{c}\right)}{\sqrt{\left(1 - \frac{v}{c}\right)\left(1 + v/c\right)}}$$

$$\nu' = \nu \frac{\sqrt{1 - v/c}}{\sqrt{1 + v/c}}$$

$$= \nu \frac{\sqrt{\frac{c+v}{c}}}{\sqrt{\frac{c+v}{c}}}$$

$$\boxed{\nu' = \nu \sqrt{\frac{c - v}{c+v}}}$$

As $c = \nu\lambda = \nu'\lambda'$

$$\nu' = \frac{\nu\lambda}{\lambda'}$$

$$\frac{\lambda\nu}{\lambda'} = \nu\sqrt{\frac{c-v}{c+v}}$$

$$\boxed{\therefore \lambda' = \lambda\sqrt{\frac{c+v}{c-v}}}$$