

# Cerenkov: His life



## Main dates

July 28, 1904: Birth in Russia

1934: His first observation of the radiation

1946, 1952, 1977: USSR State Prizes

1958: Nobel Prize for the discovery of Cerenkov radiation

1990: Death in Russia

## Other details

1928: Graduated from the Department of Physics and Mathematics of Voronezh State University

1929: Research student at the P.N. Lebedev Physical Institute

1930: Senior researcher in the Lebedev Institute of Physics

After 1935: Worked on electron accelerators

1964: Corresponding of USSR Academy of Sciences

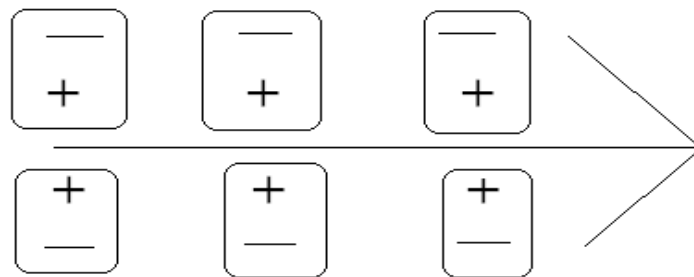
1970: Full member of USSR Academy of Sciences

# Cerenkov: The effect

## Explanation of the effect

- Charged particle in a medium with a characteristic speed ( $v$ )
- Polarization of the molecules of the medium with a specific index of refraction ( $n$ )

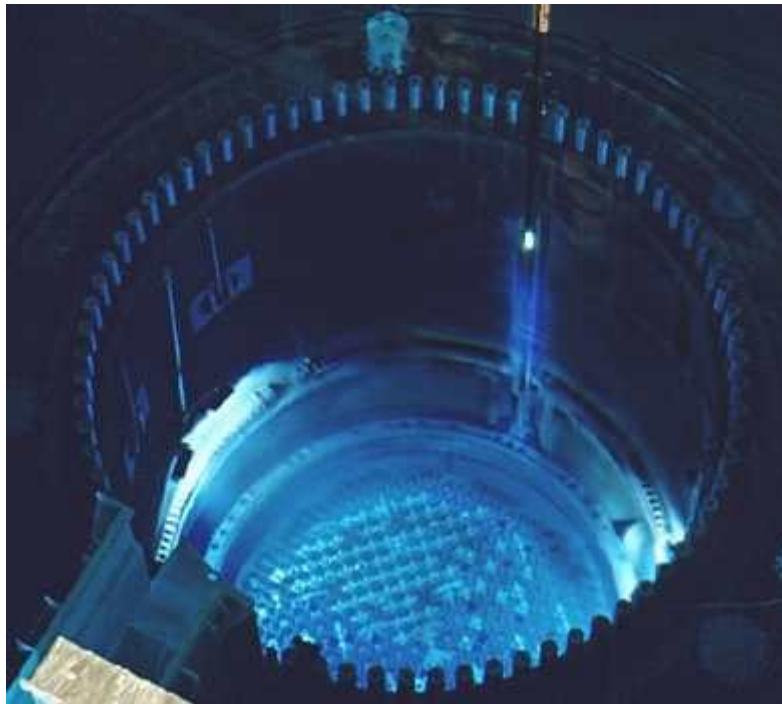
Example of a negative particle :



- Wave of relaxation of molecules:

Superposition of the spherical wavefronts

- Emission of blue light (Cerenkov Radiation)



core of a nuclear reactor

[www.physlink.com](http://www.physlink.com)

## Application of the radiation

Creation of the Cerenkov detector, standard piece of equipment in atomic research for observing the existence and velocity of high-speed particles

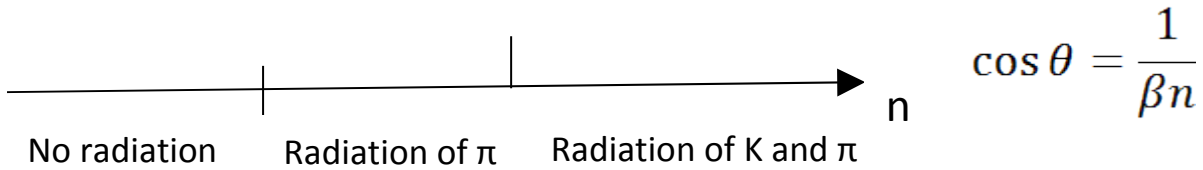
N: Number of photons emitted by the relaxation of molecules by the length  $x$  and the wavelength  $\lambda$

$$\beta = v/c$$

$$\frac{d^2 N}{dx d\lambda} = \frac{2\pi\alpha z^2}{\lambda^2} \left( 1 - \frac{1}{\beta^2 n^2(\lambda)} \right)$$

Example: Kaon (K), Pion ( $\pi$ )

Mass(K)  $\neq$  Mass( $\pi$ ) and  $p(K) = p(\pi) \Rightarrow v(K) = v(\pi)$



## Conclusion

a speed higher than the celerity of light in the medium

as the sonic boom of a supersonic