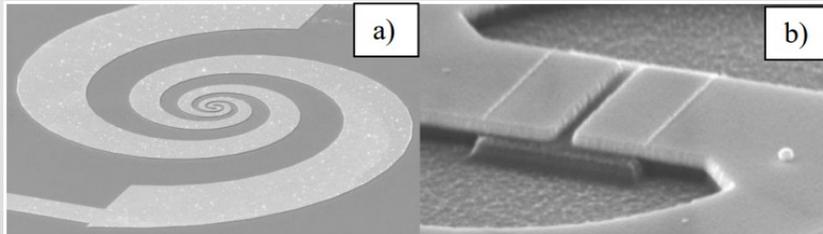


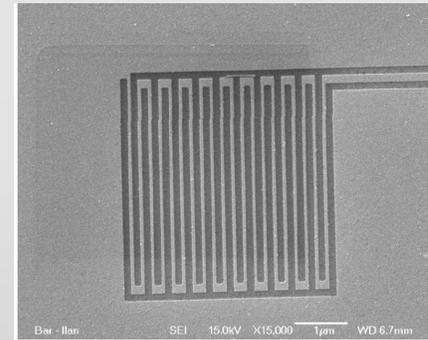
Однофотонные детекторы

Детекторы на основе явления сверхпроводимости

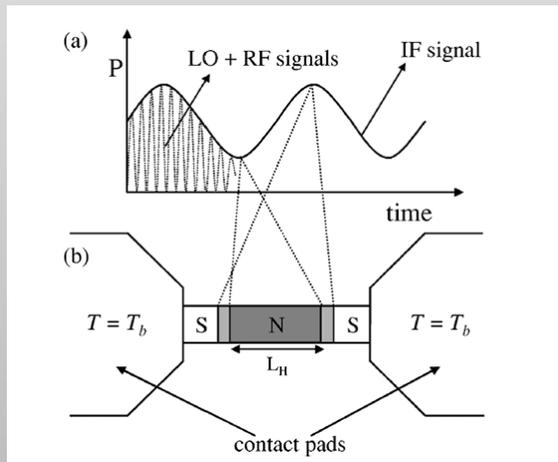
HEB



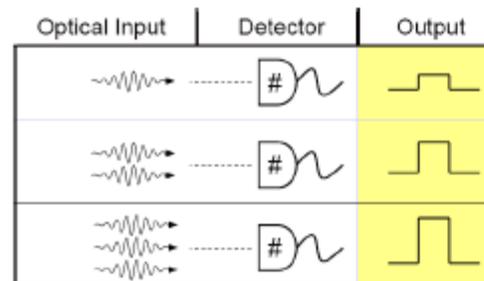
SSPD



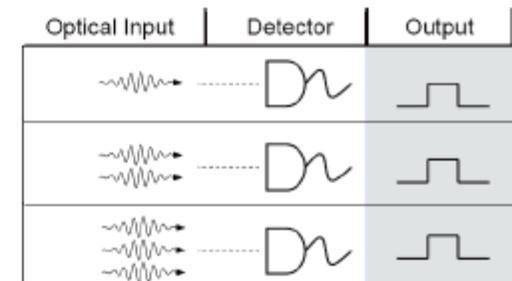
$$A_d = \lambda^2$$



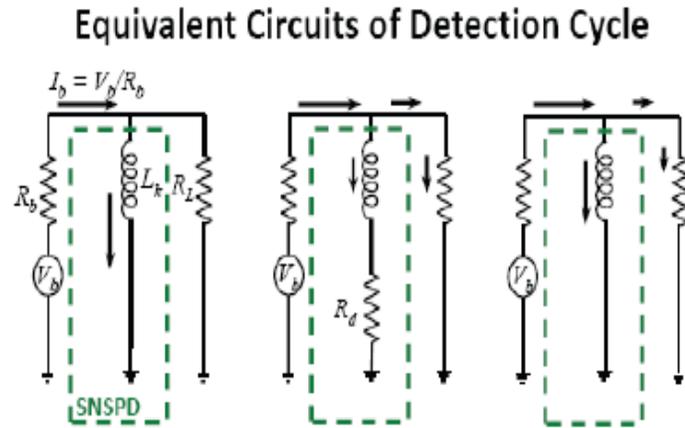
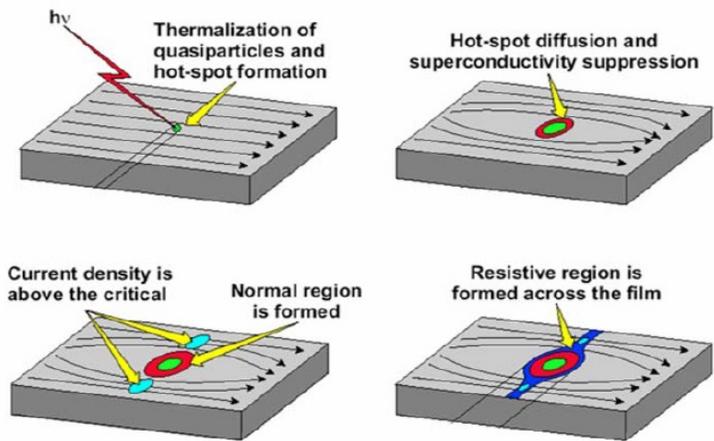
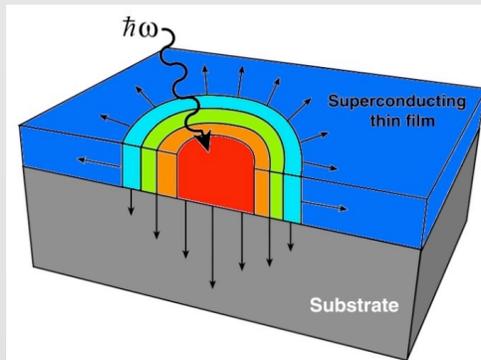
Energy (or number) resolving



Non-energy resolving

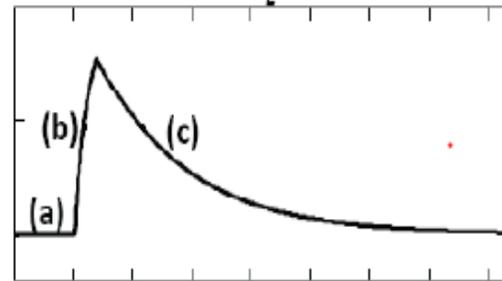


СВЕРХПРОВОДЯЩИЕ ОДНОФОТОННЫЕ ДЕТЕКТОРЫ



(a) (b) (c)

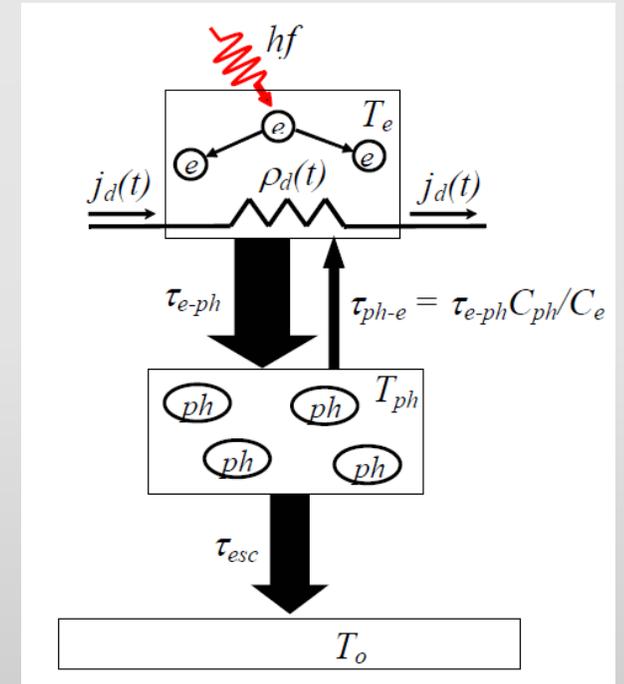
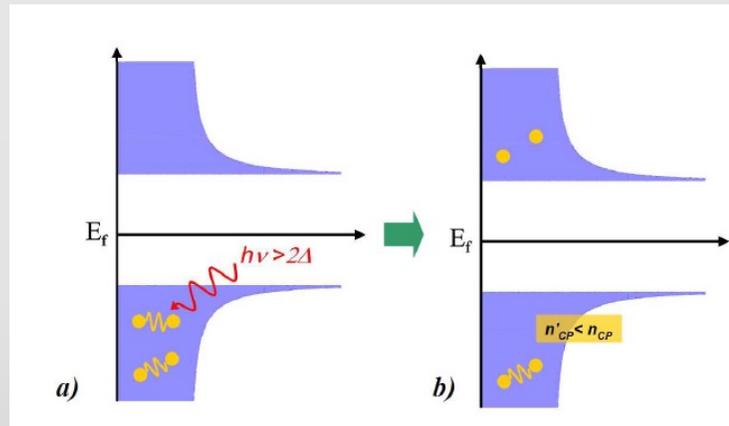
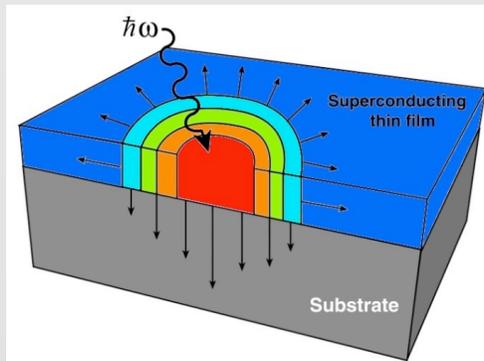
Voltage on R_L versus time



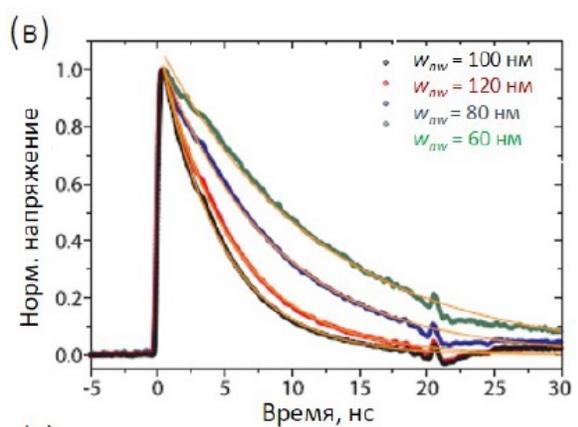
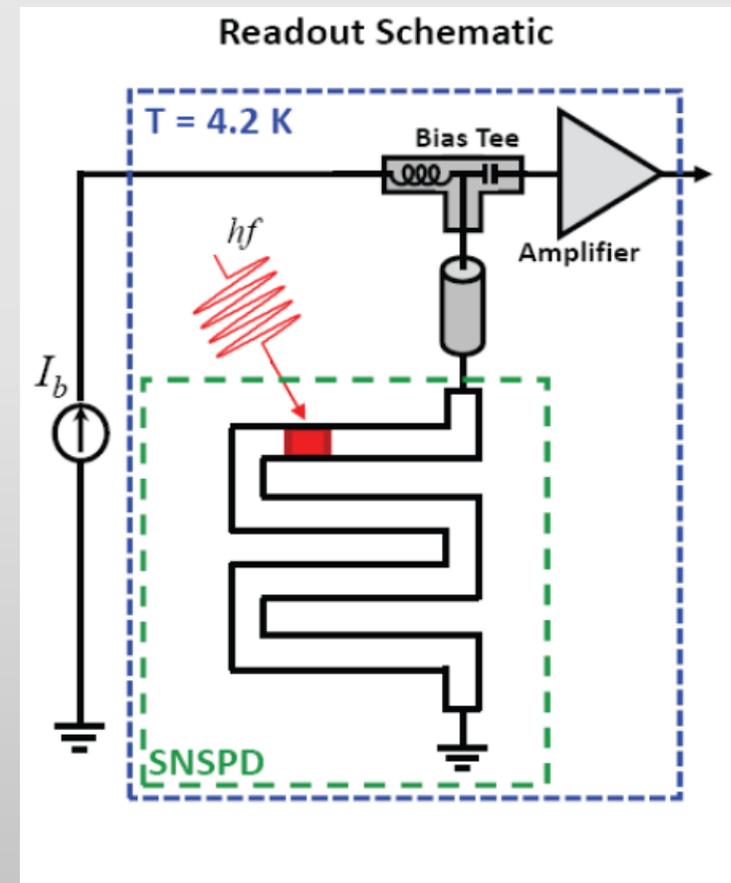
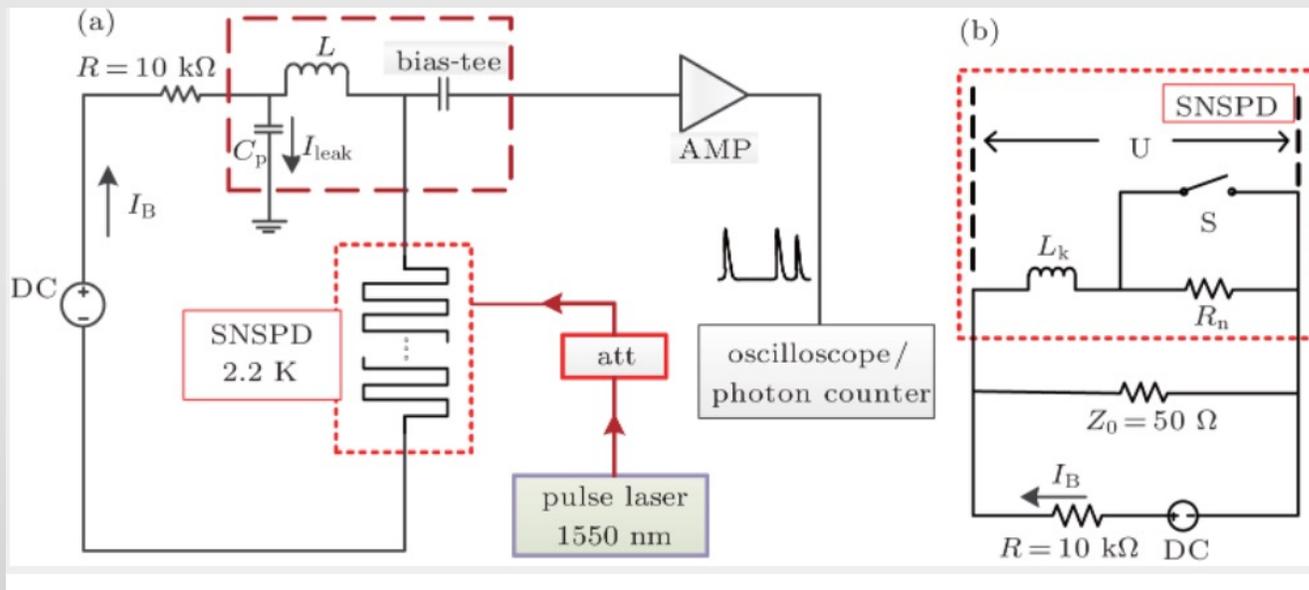
time

$$\tau_t = \frac{L_K}{R_L + R_d} - \text{transfer time}$$

$$\tau_r = \frac{L_K}{R_L} - \text{return time}$$



Parameter	Nb ($d_d = 7.5$ nm)	NbN ($d_d = 5$ nm)
τ_{GL}	~ 0.5 ps	~ 0.05 ps
τ_{e-e}	63 ps	2.5 ps
τ_{e-ph}	2 ns ($T_e = 6.5$ K)	10 ps ($T_e = 10$ K)
τ_{esc}	~ 45 ps	30 ps
τ_D	25 ps	100 ps



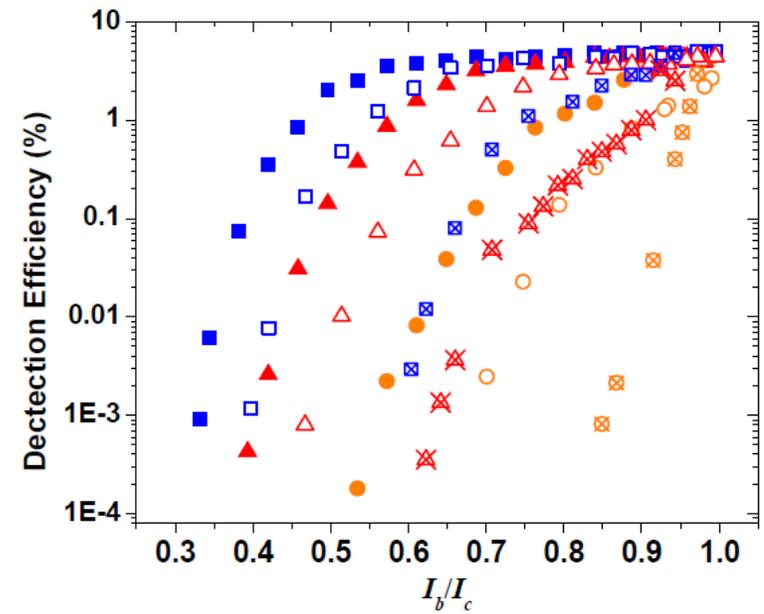
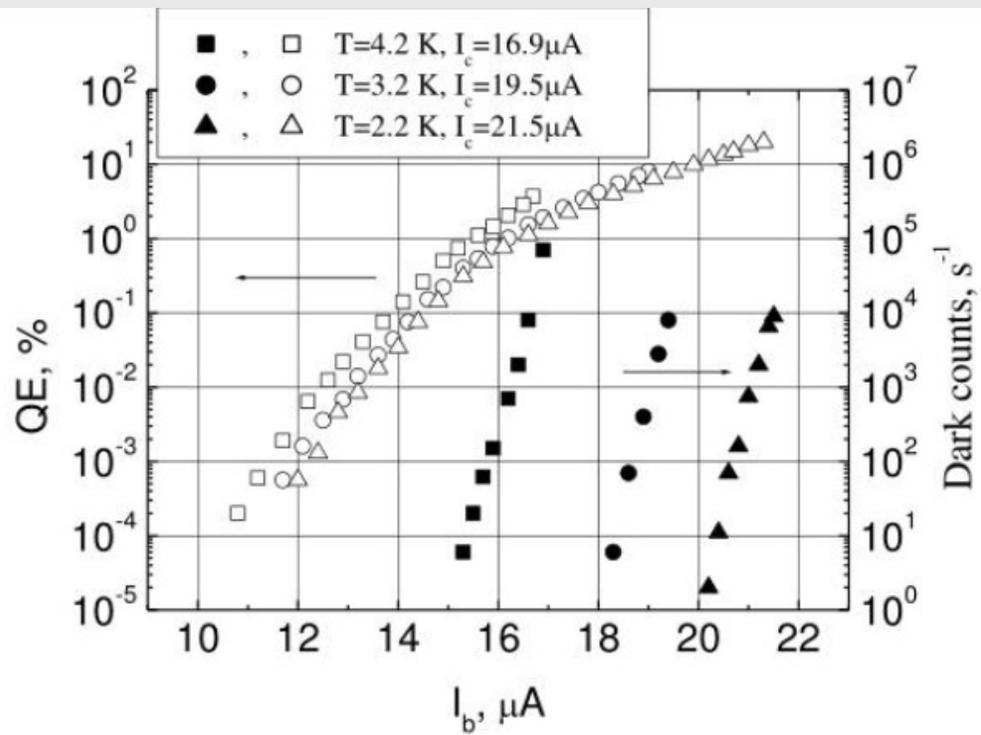
(C)

СВЕРХПРОВОДЯЩИЕ ОДНОФОТОННЫЕ ДЕТЕКТОРЫ

Основные характеристики ССПД

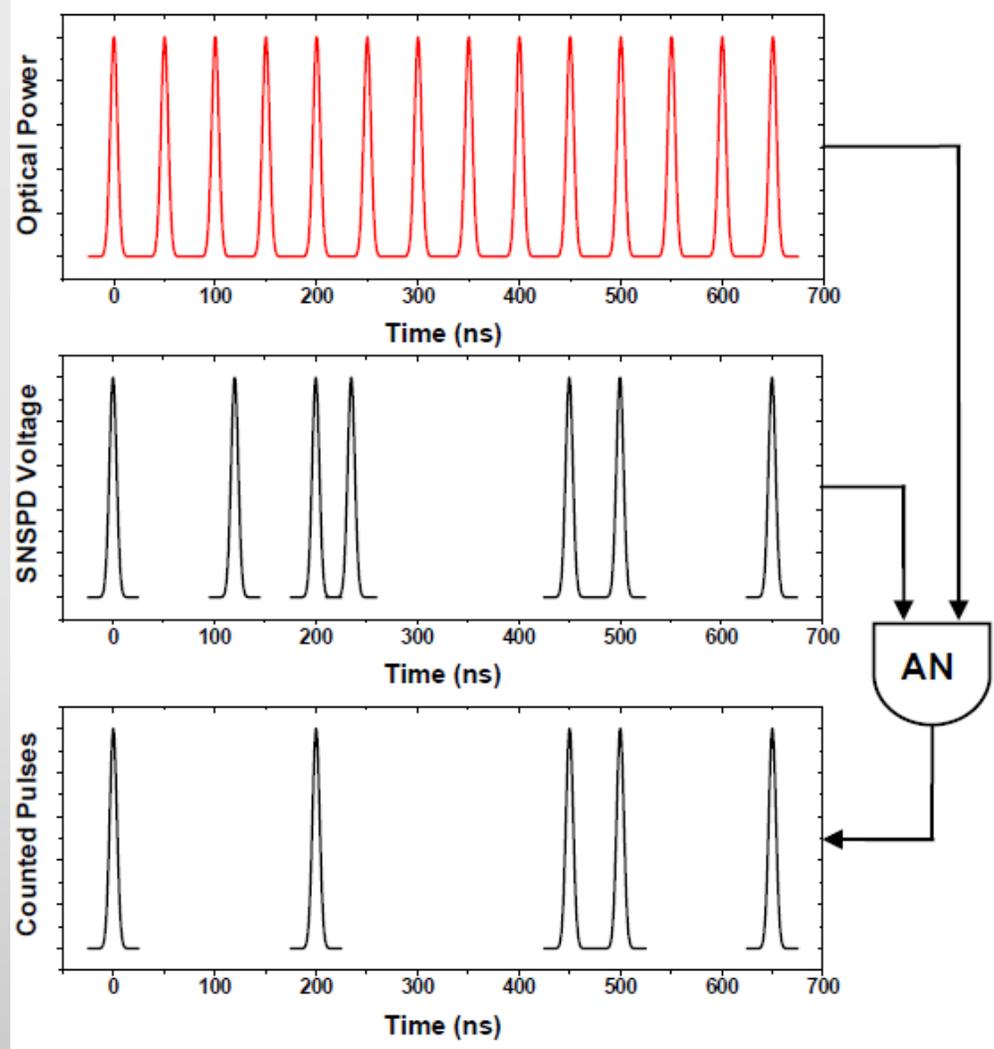
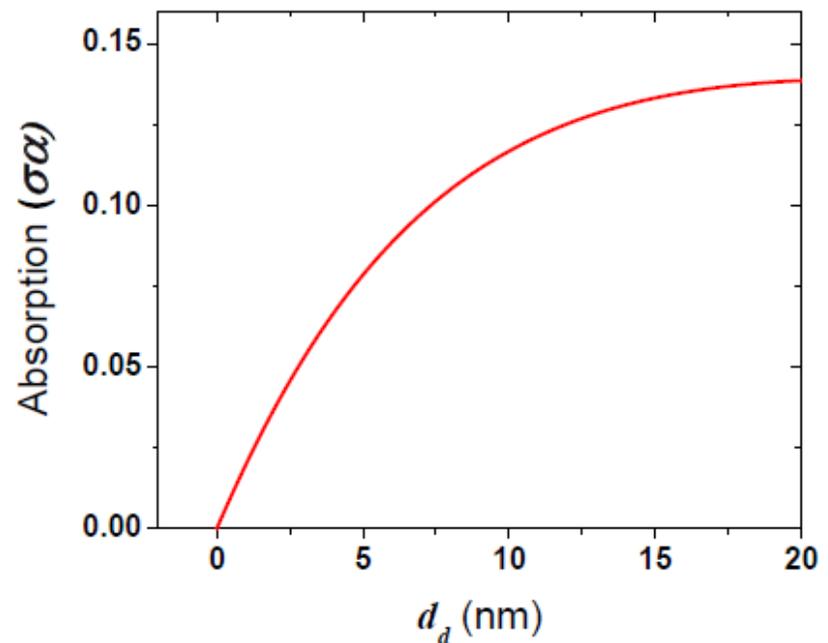
- **Квантовая эффективность**
- **Количество отсчетов**
- **Jitter**

Квантовая эффективность



- λ = 470 nm, 1.7 K
- λ = 470 nm, 4.3 K
- ⊠ λ = 470 nm, 7.0 K
- ▲ λ = 690 nm, 1.7 K
- △ λ = 690 nm, 4.3 K
- ⊗ λ = 690 nm, 7.0 K
- λ = 1550 nm, 1.7 K
- λ = 1550 nm, 4.3 K
- ⊞ λ = 1550 nm, 7.0 K

$$QE = \frac{N_c - N_d}{N}$$





СВЕРХПРОВОДАЩИЕ ОДНОФОТОННЫЕ ДЕТЕКТОРЫ

Джиттер

