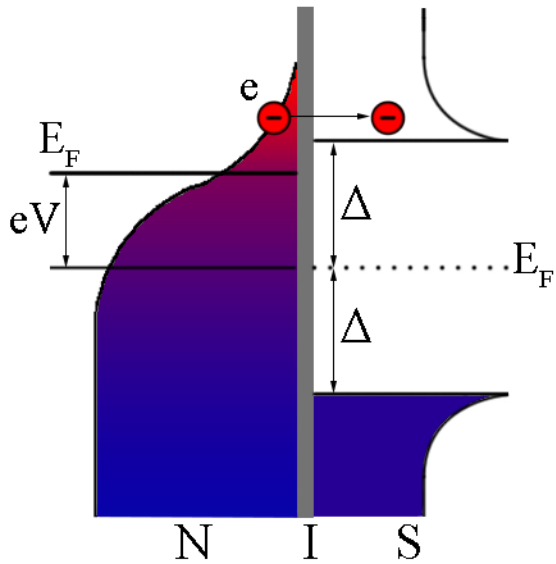


Thermoelectric transport in NIS contacts with a ferromagnetic interlayer

Student: Samatov M.R.

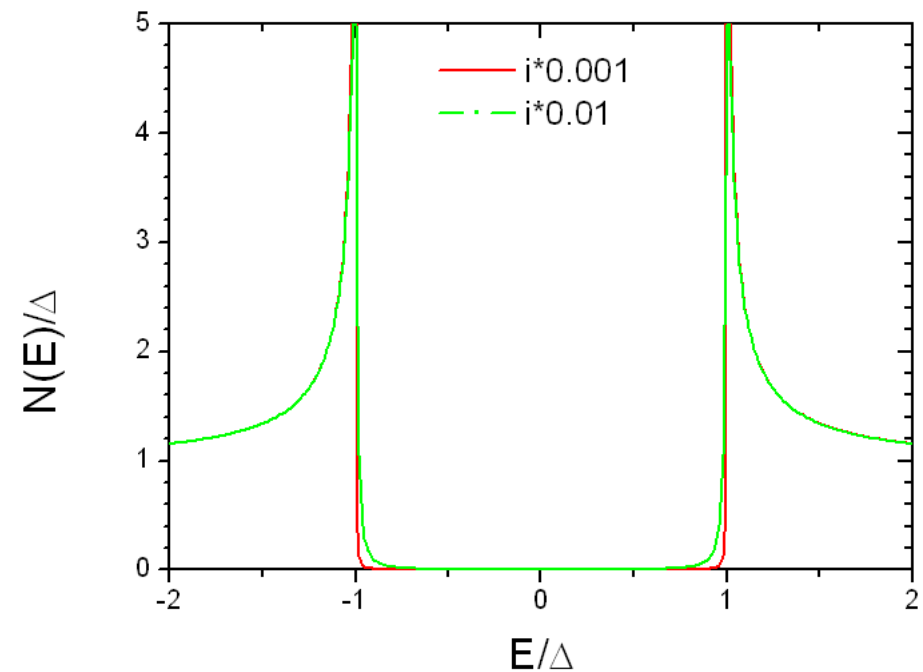
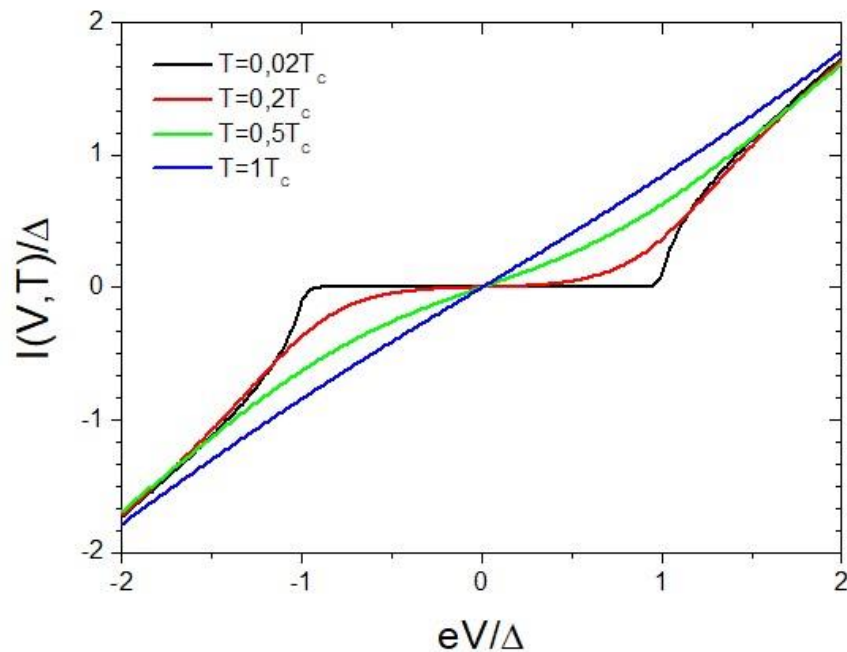
Scientific director: Vasenko A.S.

NIS tunnel junction

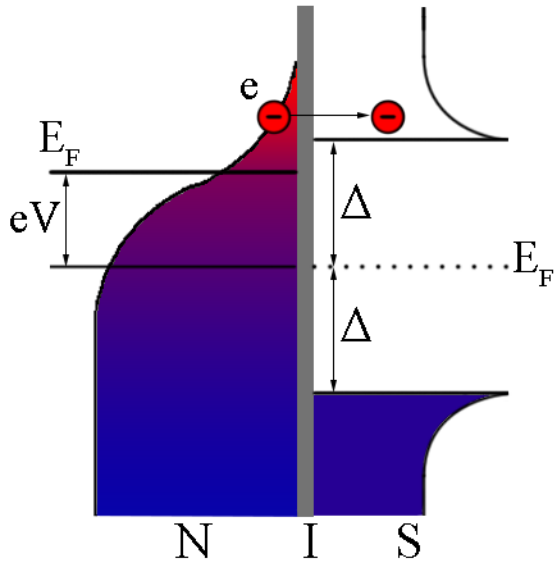


$$I(V, T) = \frac{1}{eR_T} \int_{-\infty}^{\infty} N_S(E) (n_N(E - eV) - n_S(E)) dE,$$

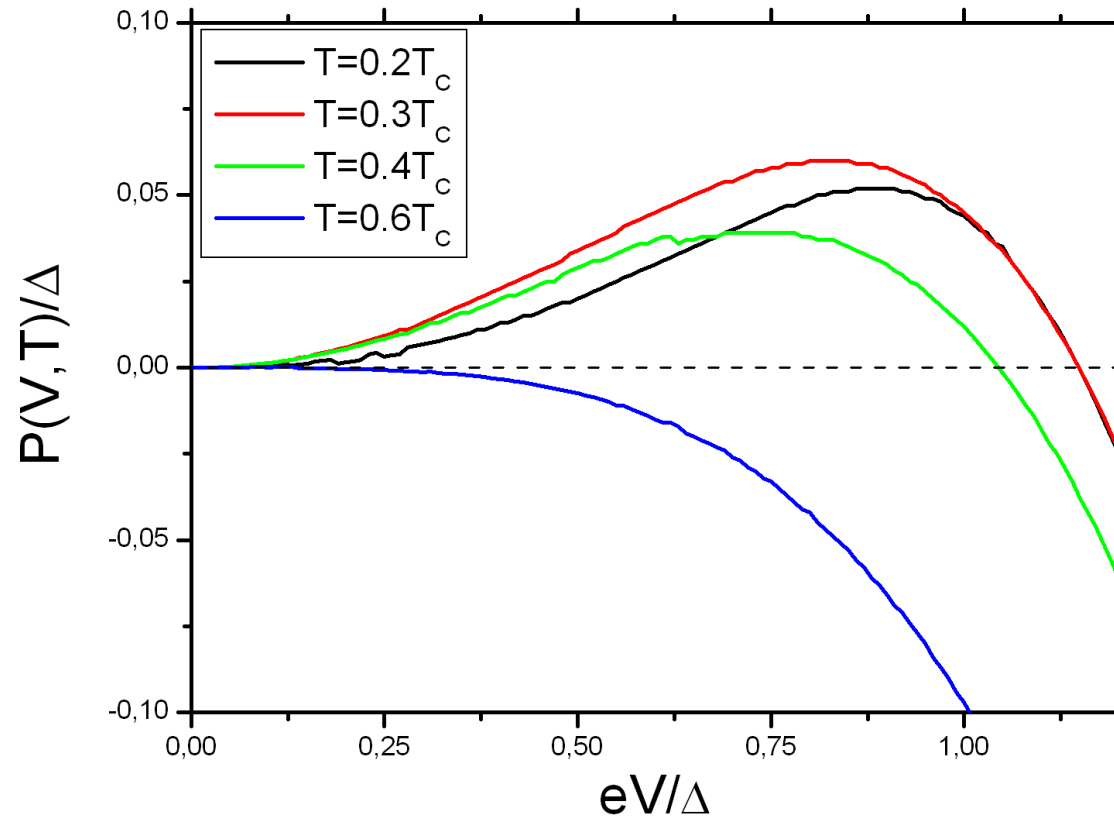
$$N(E) := \text{Re} \left[\frac{|E + i \cdot 0.001|}{\sqrt{(E + i \cdot 0.001)^2 - 1}} \right]$$



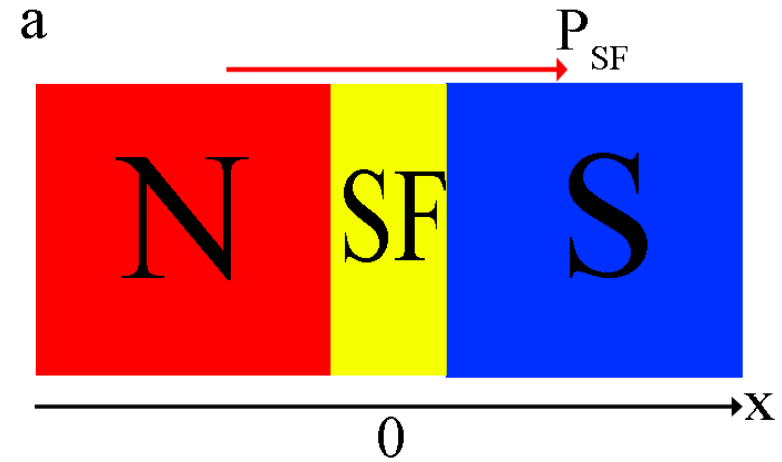
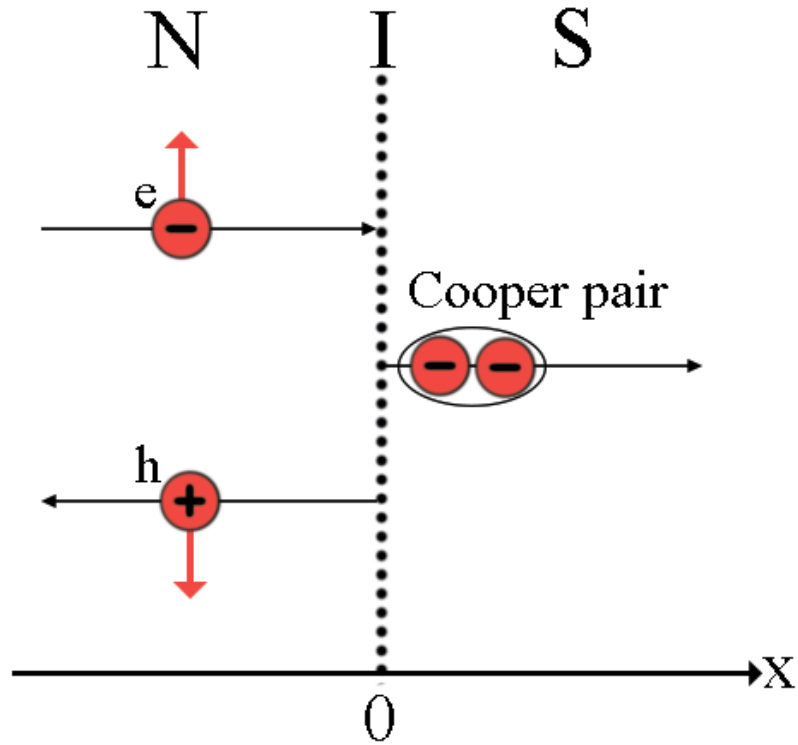
NIS tunnel junction



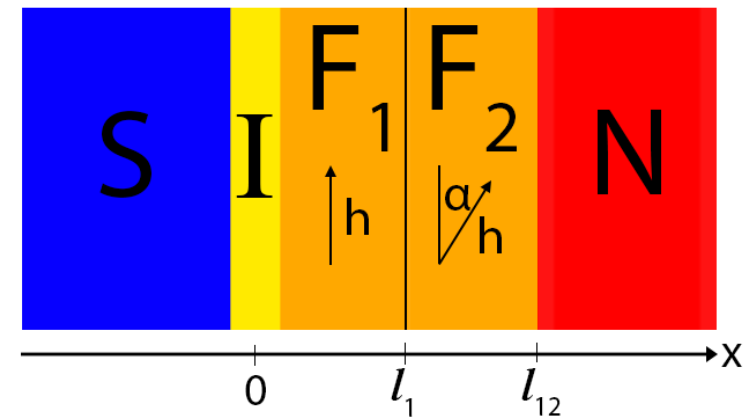
$$P(V, T) = \frac{1}{e^2 R_T} \int_{-\infty}^{\infty} (E - eV) N_S(E) [n_N(E - eV) - n_S(E)] dE$$



Andreev current



Shiro Kawabata, Andrey S. Vasenko, Asier Ozaeta, Sebastian F. Bergeret, Frank W.J. Hekking, *Journal of Magnetism and Magnetic Materials* 383 (2015).

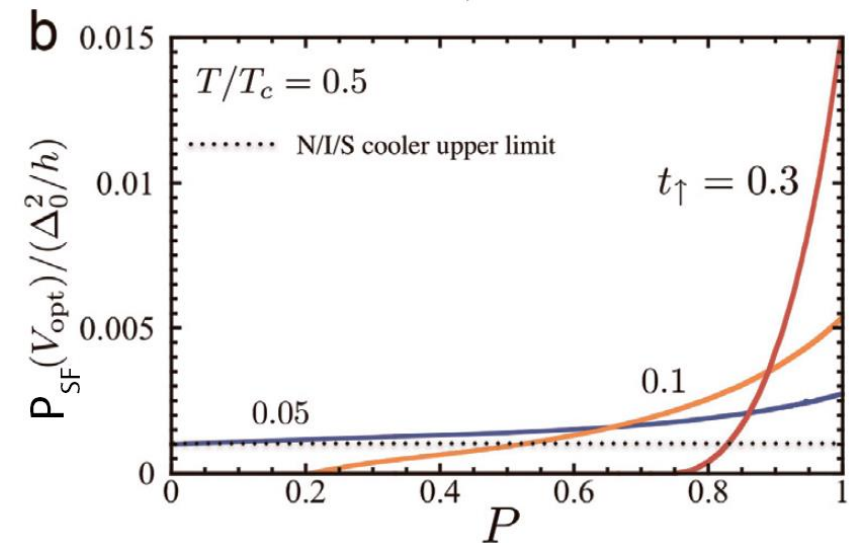
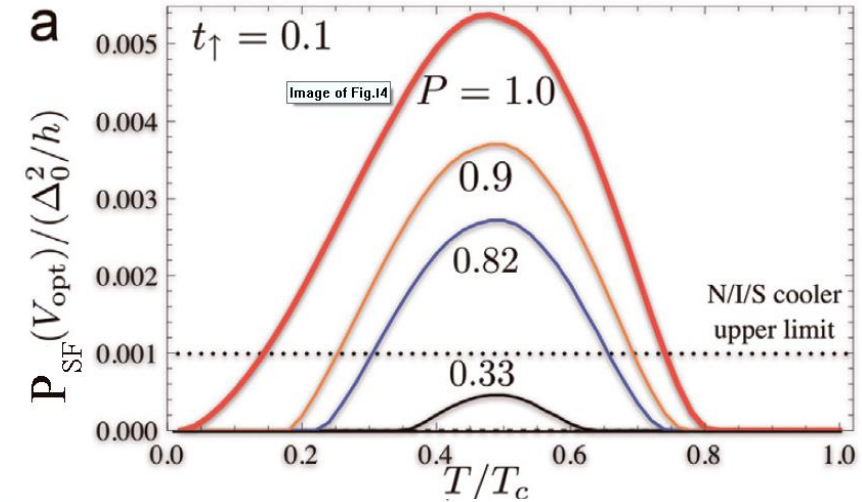
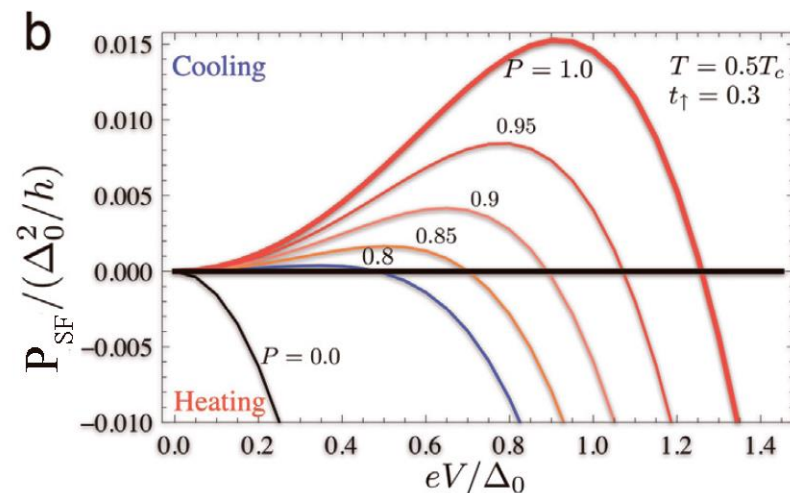
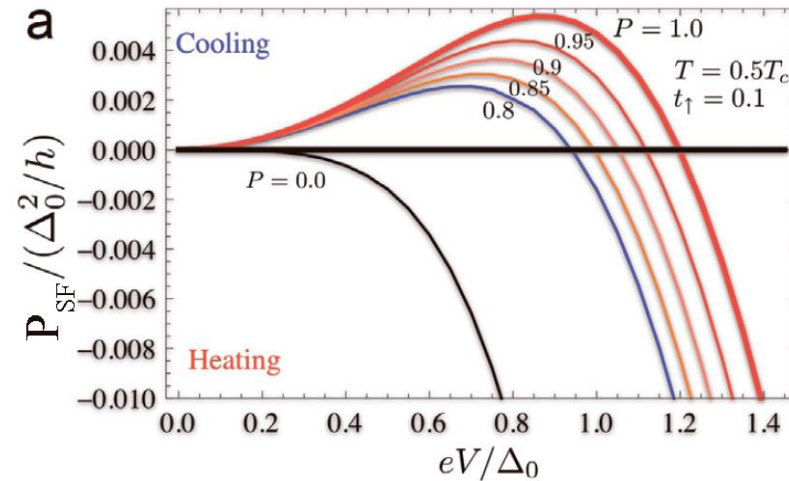
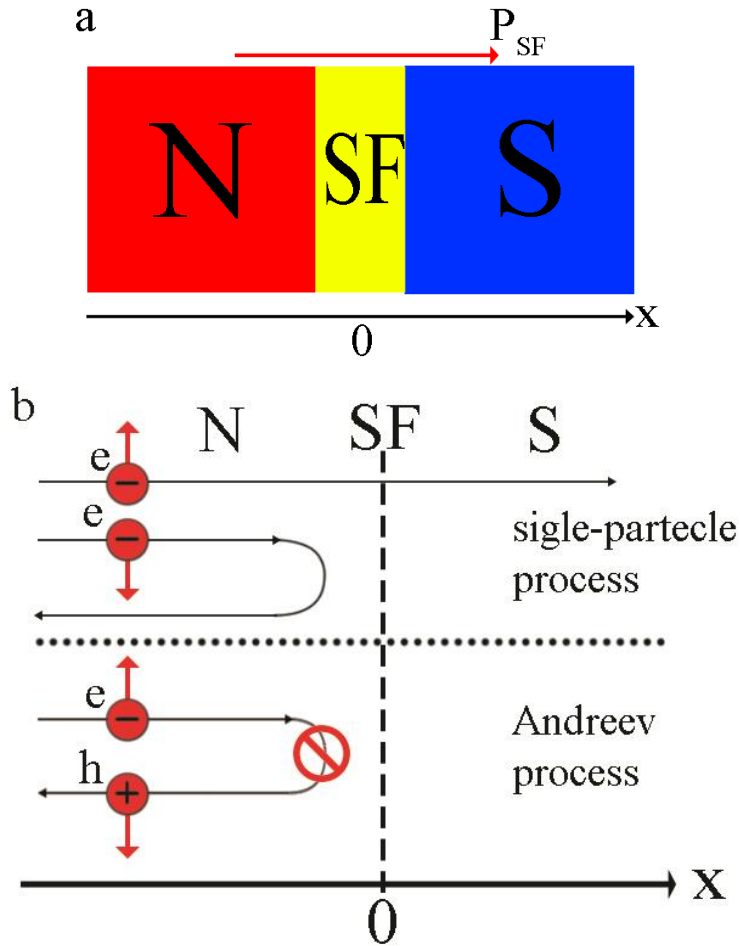


A. Ozaeta, A.S. Vasenko, F.W.J. Hekking, and F.S. Bergeret, *PHYSICAL REVIEW B* 85, 174518 (2012)

N/SF/S junction

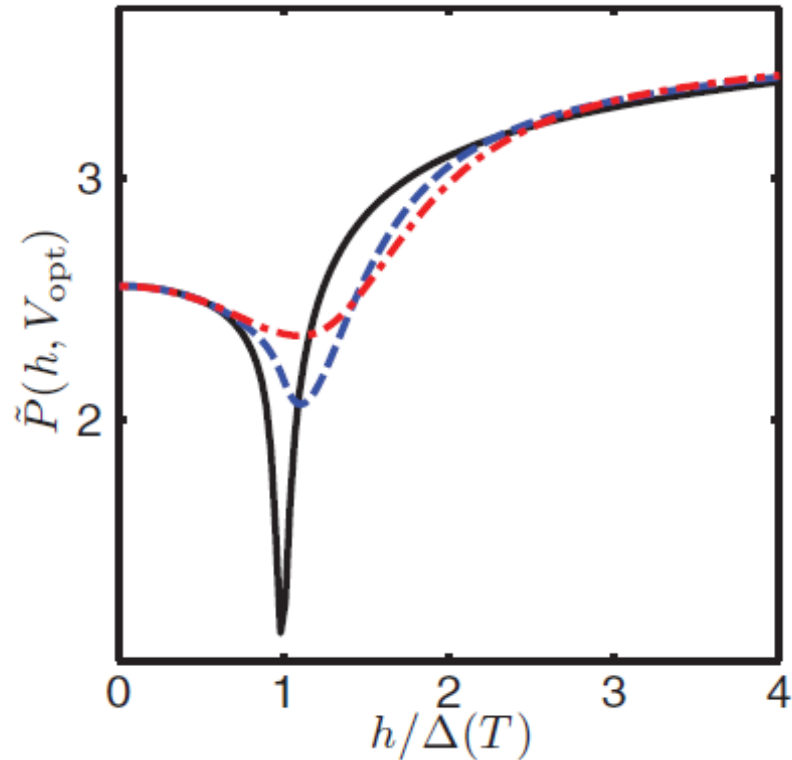
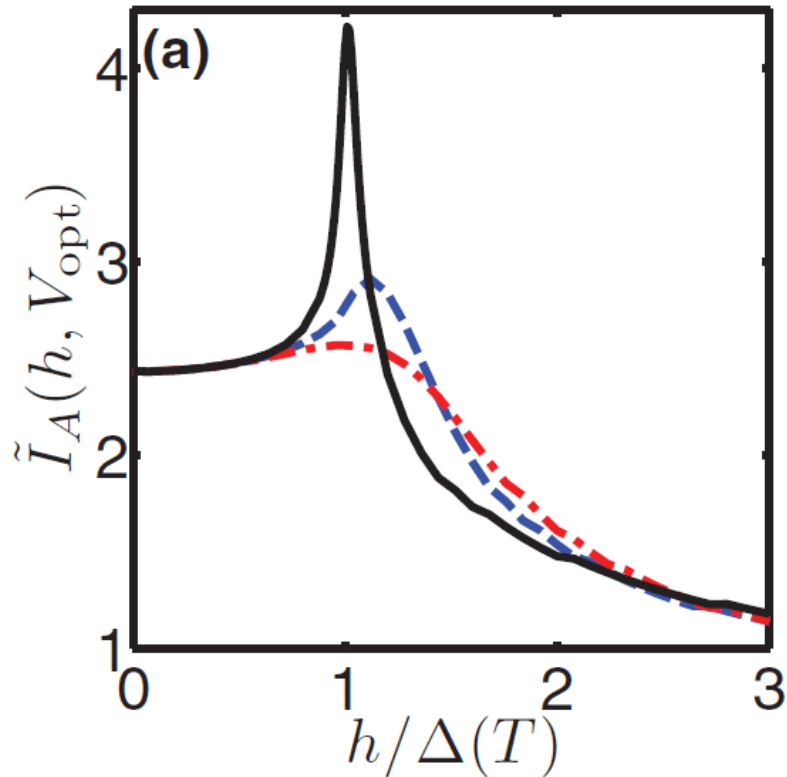
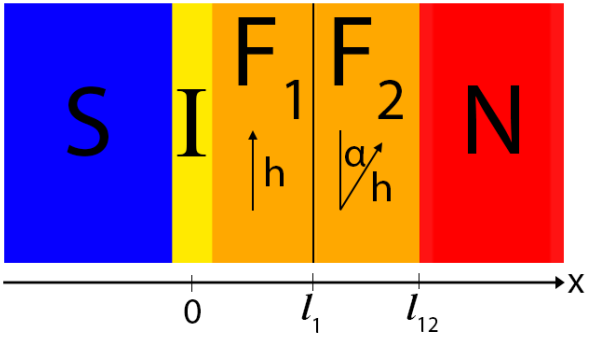
Shiro Kawabata, Andrey S. Vasenko, Asier Ozaeta, Sebastian F. Bergeret, Frank W.J. Hekking, *Journal of Magnetism and Magnetic Materials* 383 (2015).

$$P = \frac{|t_{\uparrow} - t_{\downarrow}|}{t_{\uparrow} + t_{\downarrow}},$$



SIF1F2N junction

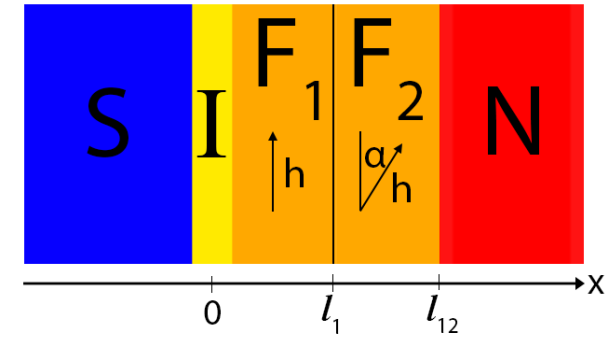
A.Ozaeta, A.S. Vasenko, F.W.J.Hekking, and F.S. Bergeret, PHYSICAL REVIEW B 85, 174518 (2012)



$\alpha=0$ – black solid line
 $\alpha=\pi/2$ – blue dashed line
 $\alpha=\pi$ – red dash-dotted line
 $W=7*10^{-3}$

SIF1F2N junction

A.Ozaeta, A.S. Vasenko, F.W.J.Hekking, and F.S. Bergeret, PHYSICAL REVIEW B 85, 174518 (2012)



$\alpha=0$ – black solid line
 $\alpha=\pi/2$ – blue dashed line
 $\alpha=\pi$ - red dash-dotted line
 $W=7*10^{-3}$

