from the magnetic layer ($\ell = \lambda_L$). The length λ is an effective distance over which the current is transformed from a spin-polarized to a unidirectional flow. The magnetic layer is assumed to have its magnetization in the z direction. When we refer to the region a ( ) the nonmagnetic contact, we mean the positive (negative) direction along the z axis.

We calculate the spin accumulation due to current flow through a ferromagnet using the same method described in Ref. 4. We consider the behavior of the spin accumulation in the nonmagnetic layer for an arbitrary magnetization $\vec{M}=M\vec{r}$, where M is the saturation magnetization. A

$$\vec{J}(\ ',\ ') = \frac{I}{2\pi D_{,\ *}} F(\ ')(H(\ ' - t - t_{,})H(t + t_{,}) + D_{,} - \ ')$$

$$- H(-t_L - \ ')H(\ ' + t_L + D_{,}))$$

$$- \frac{I}{\pi^{2}_{*}} H(\ ')H$$

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d i i ing f e e nc

Thi [illegible]

$$, \quad \frac{\vec{}}{|\vec{}|}, \quad \vec{} = \frac{1}{\pi}\int_0^{2\pi}\int_0^{1} \vec{}(\,',\phi',\,t)\,'\,'\,\phi', \tag{A2}$$

hich e e a he ie a i f he l gi di al i ac-c la i . The al i acc la i i

$$\vec{}^{*} = \vec{}^{*}_{\perp} + (0) + (t), \quad \vec{}_{\perp} = \vec{} - (\vec{}\cdot), \tag{A3}$$

he e he l gi di al i acc la i i he f he c ib i f each i e face =0 a d =t.

F a if a lied eld f he f $\vec{}_{*}$ = $_{*}$(i θ_* c ψ_*, i θ_* i ψ_*, c θ_*), he di e i ela i f e cha ge i a e i a hi hl i

$$\omega^2 = (\eta^2 + {}_{*}\,\mathrm{c}\,(\theta - \theta_*) - \mathrm{c}^2(\theta))$$
$$\times(\eta^2 + {}_{*}\,\mathrm{c}\,(\theta - \theta_*) - \mathrm{c}(2\theta)), \tag{A4}$$

he e θ i he e ilib i ag e i a i la a gle a i-f i g $_{*}$ i $(\theta - \theta_*) - \frac{1}{2}$ i $(2\theta) = 0$.

We b ie di c he e ical e h d e ha e ed l e E . (2). The la c di a e e i a a ic la l efficie a d acc a e ch ice f acc i la i . The di e i a i e e i if i adi (i e , a d e , g id) a d if i a gle:

$$= \;(- 1/2) \;\frac{1}{2}(\;+\; ,t)(- 1/2)$$

$$+\frac{1}{2}(- \;+\; ,t) \;\mathrm{l}$$

$$\times\left[\mathrm{c}\;\;\mathrm{h}\left(\frac{- \;+ 1/2}{}\right)\right]\left[\mathrm{c}\;\;\mathrm{h}\right]$$

$$\vec{A}_{\perp} = \int_0^{2\pi} \int_0^1 \frac{\alpha\,(\,R\,)\,\vec{r}\,'_{\perp} - \alpha(1 + R\,\ln(R)/\ )\,\vec{r}_{\perp}}{R}\ d\rho'\ d\phi'$$

$$+\ \alpha 4E(\ ^{2})\,\vec{r}_{\perp} + \frac{\alpha}{\ }\vec{r}_{\perp} \int_0^{2\pi} \int_0^1 \ln(R)\ d\rho'\ d\phi',$$

$$\vec{r}\,'_{\perp} \equiv \vec{r}_{\perp}(\rho', \phi', \tau), \quad \vec{r}_{\perp} \equiv \vec{r}_{\perp}(\rho, \phi, \tau),$$

where $4E(\ ^{2}) = \int_0^{2\pi}\int_0^1 \rho'/R\ d\rho'\ d\phi'$ and E is the complete elliptic integral of the second kind.