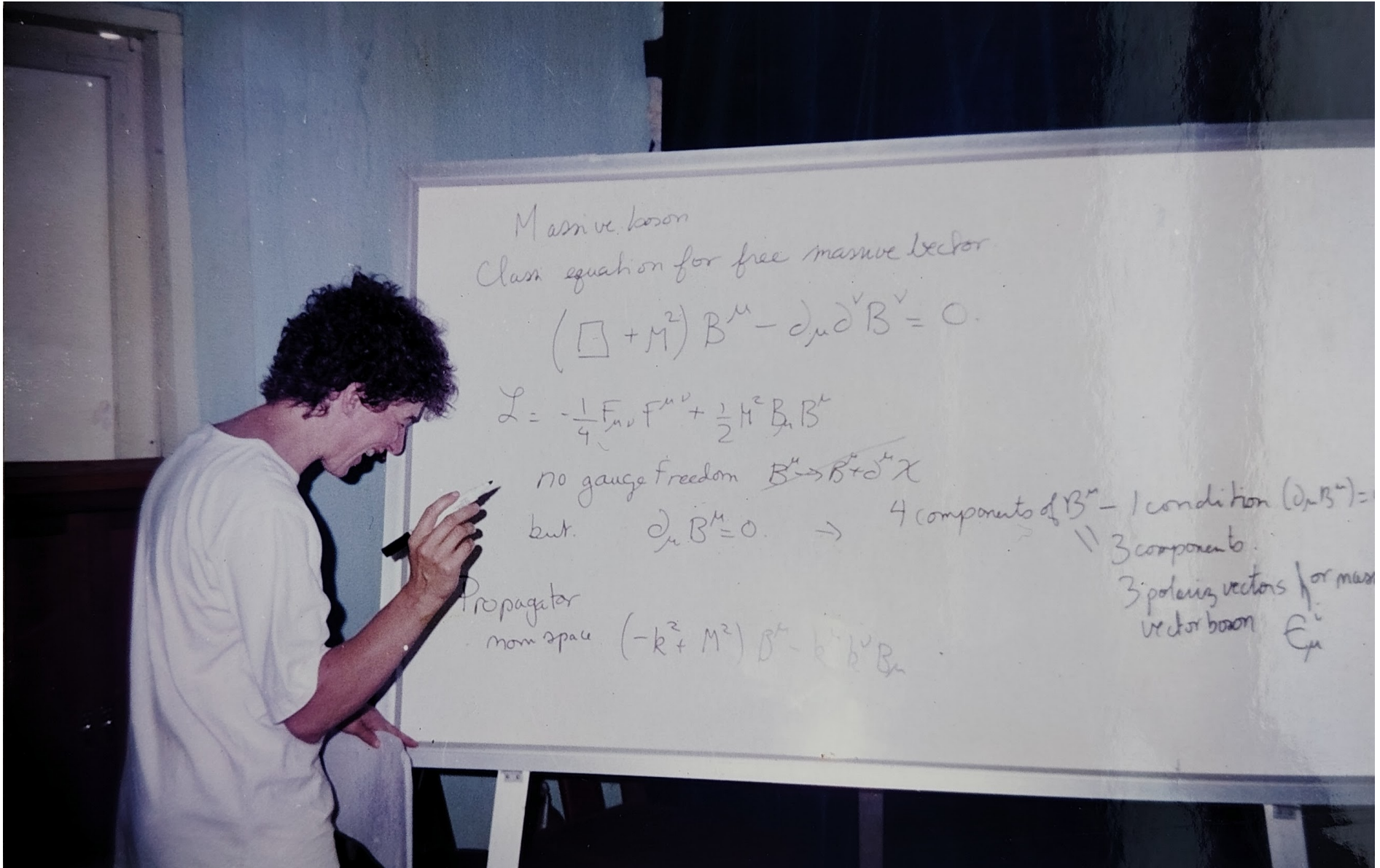
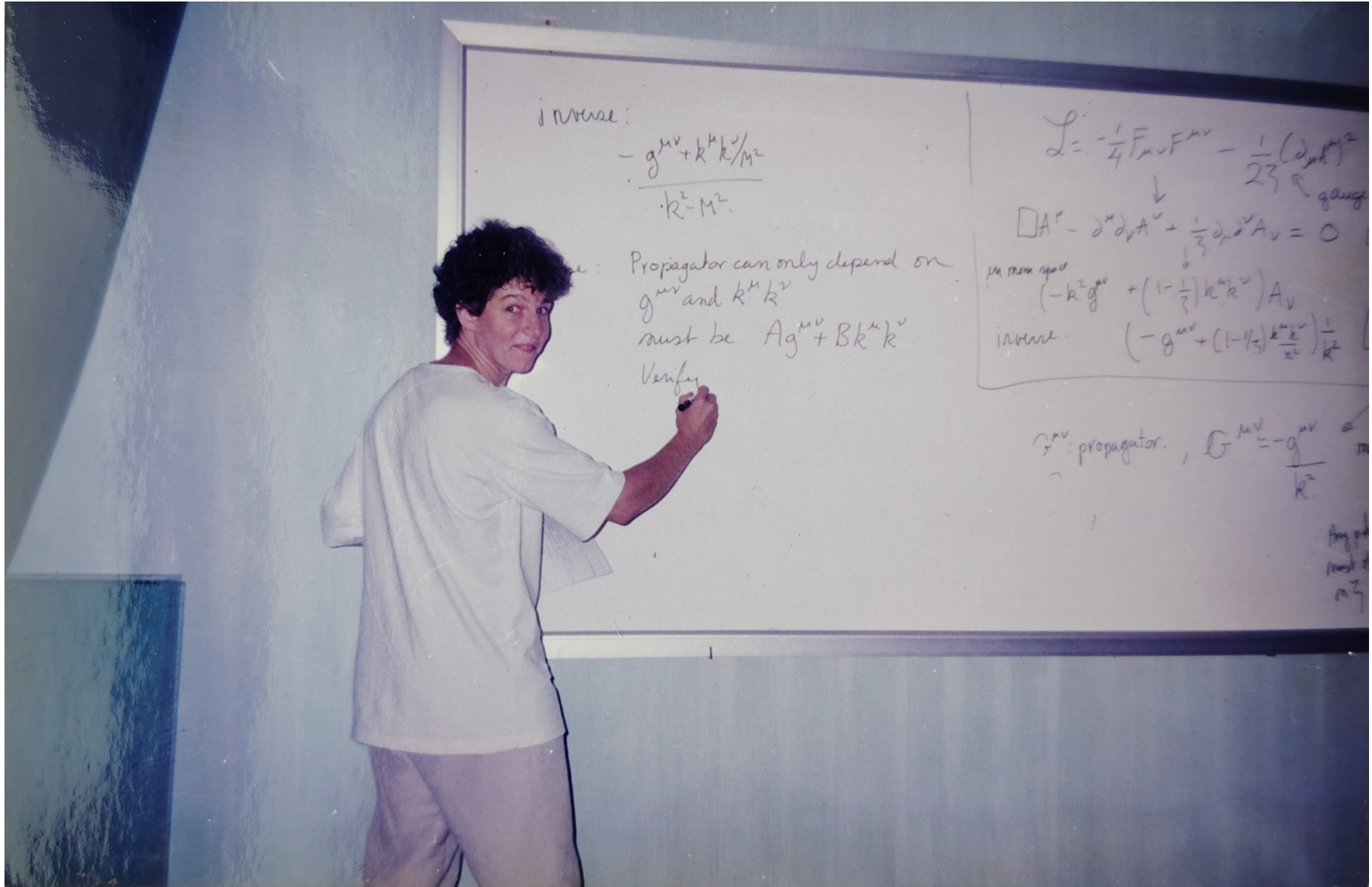
Geneviève and the Vietnam School of Physics


Massive boson
Class equation for free massive vector
$(\Box + M^2) B^\mu - \partial_\mu \partial^\nu B^\nu = 0$
$\mathcal{L} = -\frac{1}{4} F_{\mu\nu} F^{\mu\nu} + \frac{1}{2} M^2 B_\mu B^\mu$
no gauge freedom $B^\mu \to B^\mu + \partial^\mu \chi$
but $\partial_\mu B^\mu = 0$ →
4 components of B^μ − 1 condition $(\partial_\mu B^\mu) =$
= 3 components
3 polarisation vectors for mass
vector boson ϵ^i_μ
Propagator
momspace $(-k^2 + M^2)$


inverse:
$-\frac{g^{\mu\nu}+k^\mu k^\nu/M^2}{k^2-M^2}$
Propagator can only depend on $g^{\mu\nu}$ and $k^\mu k^\nu$
must be $Ag^{\mu\nu}+Bk^\mu k^\nu$
Verify
$\mathcal{L} = -\frac{1}{4}F_{\mu\nu}F^{\mu\nu} - \frac{1}{2\xi}(\partial_\mu A^\mu)^2$
gauge
$\Box A^\nu - \partial^\mu\partial_\nu A^\nu + \frac{1}{\xi}\partial_\nu\partial^\nu A_\nu = 0$
in mom space
$\left(-k^2 g^{\mu\nu} + \left(1-\frac{1}{\xi}\right)k^\mu k^\nu\right)A_\nu$
inverse
$\left(-g^{\mu\nu} + (1-\xi)\frac{k^\mu k^\nu}{k^2}\right)\frac{1}{k^2}$
$\mathcal{D}^{\mu\nu}$: propagator, $G^{\mu\nu} = -\frac{g^{\mu\nu}}{k^2}$


KAYAK SANS FRONTIÈRES


THANK YOU !