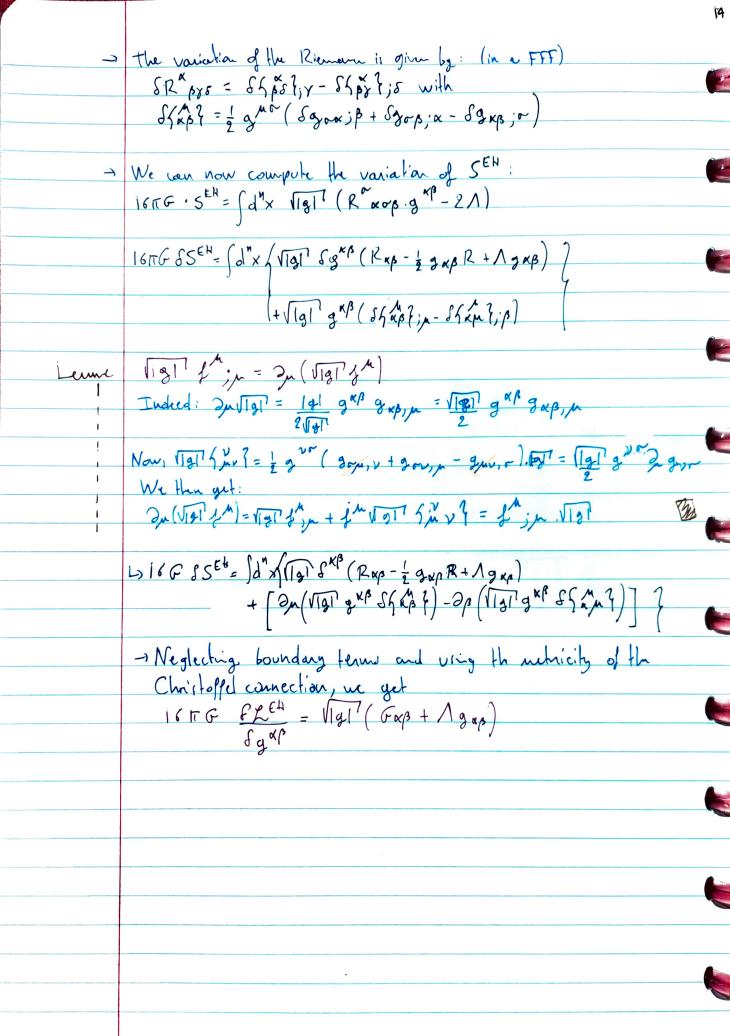
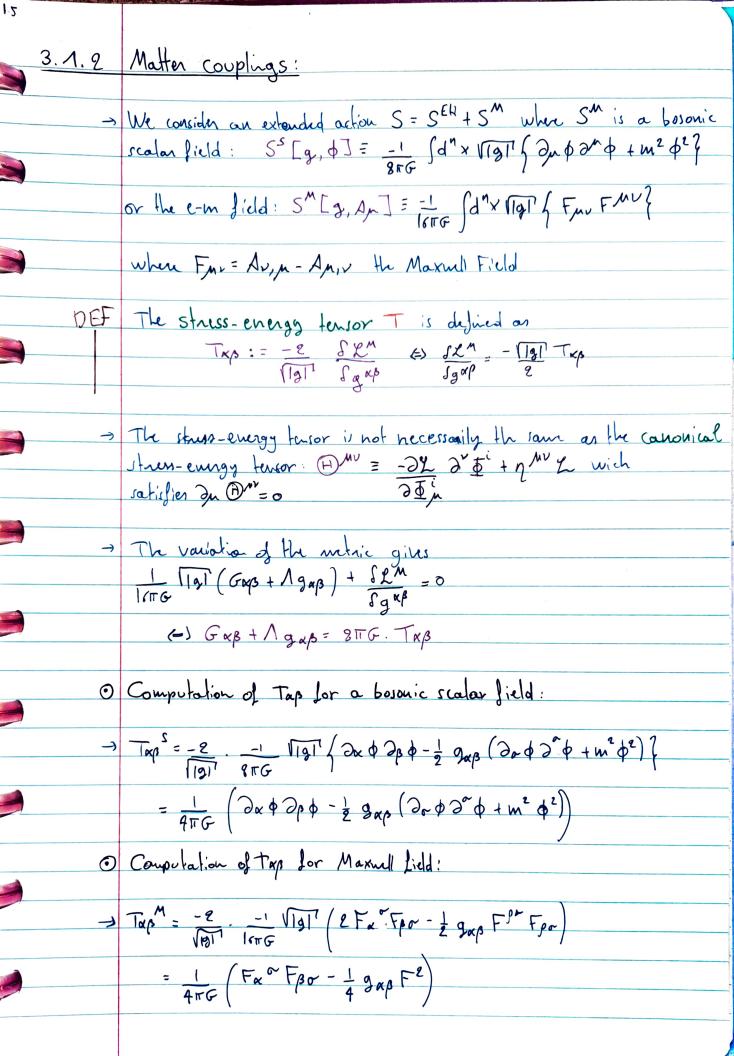
131 APPLICATION TO EFE 3.1 Metric Lormulation 3.1.1 Variational principh in metric formulation The Einstein-Hilbert action is defined as

SEN[g]= 1 | d"x | [g] | R(g) - 21? where R=R" x is the trace of the Ricci tensor, the Ricci tensor being Rxp = Rm xps = g m Rrxpp and where A is the cosmological constant. → We use the Christoffel comexion [= 5 } such that

R^{a}_{\alpha\beta\gamma} = ∂ρ 5 / 2 + 5 / 2 / 2 / - (β.) = 2p [x + [p [xy - (2x [p x + [ry [p x) 8 / 191 = - 1 / 191 gas sg xp = +1 / 191 g xp sg xp DEMO (@ First, notice that for a matrix A = SAS-1 with A diagonal, we have Let 1= Ti Di and Ti li= exp{Ei ln (li)}= exp{tr [S.log1.5-1]}: exp{tr [log A]} Nence, Jet A = exp{Tr log A} O For a variation of the elevent of A, we have: SIn[Jul] = StotA] = STr log A = Tr & log A = tr [A-1 SA] Then for a Lovertzian manifold ((1, h-1)), we have let gm = - g, and SIng = S(-g) - Tr (g, " (g, op) = g, " (g, n) => Sg = g.g. M Sgm => S [1] = -1 1 S |g| = 1 [-g] g m Sgm





1.3		
	Prop	Under an infinitesimal differ, the variation of the metric is given by its Lie derivative:
		Ss 2mu (x) = g/nu (x) - gnv (x) = 25 gnv = 25 (n sv) = 25 (v;n)
		DEMO Indecd,
	9 (& g _{mν} (x) = g _{mν} (x) - g _{mν} (x) = g _{mν} (x'+5) - g _{mν} (x)
		$= \underbrace{5}^{\infty} \underbrace{\partial_{N} g_{N}(x) + \underbrace{\partial x^{\prime}}_{N} g_{N}(x)}_{\partial x^{\prime}} \underbrace{\partial x^{\prime}}_{\partial x^{\prime}} \partial x$
		= 500 gmv (x) + (5m +5",m) gmp (x) (5m + 5h, v) - Jmv (x)
and the same of th		= 5 ~ 2 gm (x) + 5 in gxx + 5 in gmp = £5 gms
	J	= 5° gmuja + 5° jngav + 5° jvgjap = 5vja + Snjv
	3.1.4	Isometrier and Killing vectors:
and the second	DEF	Under a diffeomorphism, the metric transform as
		$g'_{MV}(x') = \frac{\partial x'_{K}}{\partial x'_{K}}(x) g_{KB}(x) \frac{\partial x'_{K}}{\partial x'_{K}}(x)$
		A metric gy (x) is sait to be form-invariant if
		Any transformation that satisfies this equality is an isometry
		Any transformation that satisfies this equality is an isometry
	→	An isometry is a special case of a diffeomorphism
	<u></u>	For an injenieural coord. transfo, we have:
		δς gmv (x) = δο jp + Sp; ~ = 0
•		-> Those 5th (x) are Killing rectors.
	Prop	Let LEH = 13 (R-21). The invariance of the action under linite transformations gives So LEH = gr (SM LEH)
		(inaviora: d'x' Va'l' (R'-21) = d'x Val' (R-21)
		Indeed, let's show that
		dnx'LEN[g'xp(x)), d'u g'ap(x)), d'u d'y gxp(x)]
H		= I'x LEH [gap (x), On gap (x), On Dug ap (x)]