	a taste of
	LECTURE 27: GAUGE THEORY 28 NOW
anannika dagai ara anannya ng Pandik dagBadai 14, 1874 1874 1886	That I we goings sym.
entre establishment en entre establishment en entre establishment en entre establishment en entre establishmen	BEMINDERS:
	(1) please fill out course evaluations
	on iEval peared
	-> feel free to email, feedback / wish.
	directly to me
	(2) Grading: exact rubric TBD:
	but it you've completed most of the
	nonework, I'll grade from (B+, A)
	S NEED TO HOVE DONE ENOUGH
	to stow: Green's func ? Contour Int!
	-> if not: B.
merimaan maarit too kaalan maalaan kankaasilan taadi esiaalah (kek 1) 490,00 ali esialih	
د به در این در این در این در ای	LAST TIME SPACETIME SYMMETRY
	s remorkably substre repolimen:
. (1995) - (	Now we understand &
en anno a sen ann se anno se anno se anno anno anno anno se anno se anno se anno se anno se anno se	porticles of a given son
hayd 1989 february am 14 february Phanesternach at Aller and he to he february and a second second at the second s	
name, a Pet A Pet 1979 - on Pet 1980 - 17 ml a 1970 de 1990 A A Pet I Pet III de A Pet I Pet III	WE DIDN'T BO IN DETAIL, BUT POINTED OUT
	WHERE THINGS ARE TRICKED & YOU GET
menana ann an menana an an ann an an an an an an an an a	NEAT BEADILOIS.
ganghanan at 1 gagan ((1 Manga) (1 g Met 4 (1 min)) et familiën et 1 chan in 1 d Ambrid (2 min)	
erthan onthe transmission and an extensive the flowest of the state of	
o callenged to decrease "An "Antiffed to the "Profession Andread and to be a served	

 JARGON: Some related ideas
[FUNDAMENTAL]  CAUCE  FIRER / PRINCIPAL BUNDLE FORCE
 GANGE describition FLETO 1
CONNECTION COVARIANT DERVATIVE OUR FOCUS TODAY  MORE LIKE GR 1175 MAZHEM.
3001. Standorg Wods/
 ALL SYMMETRIES THAT WE HAVE CONSIDERED THUS FAR ARE GLOBAL.
 et vs etam Ta
 constant parameter my smitssage mis have,
twist a lot there

eg.	T T		GP2VT		ナナ	カカ	
	TT		Stand de grant de grant de destruction de destruction de de la grant de grant de grant de grant de grant de gr		and the second s		
		savenne advine, samo em a france — territorio de distribución de la		Moder to solve the source of the solve to the solve to see the	en e	er der er de er	
	(ey)	uusalahkko (***********************************		"Think of the letter has a select of the letter of the letter has been as a select of the letter of the letter has been as a select of the letter of the let	The Paris State of the Paris The State and a State of the The	Tradicis and Tradicis and Tradicis and Tradicis and America and Americ	
<b>T</b>				1:00-0		million services of the self-transmission from the	1
		/	. 1	e ea			station vot
	anni anti anti anti anti anti anti anti			1N 8			
						rangan 180-an Wangan 190 ang kalaban kalabaha T	
<u> </u>	for a lattice	2 to	BINS:	Bthe	ig of	1 1003	eserg ab;
GAUGE	SYMMETR	IES	ARE S	SP=O'A		Aw:	
TALAT	itsus E	OCALLY	and an artistic state of the discount of the state of the	of his most a state of the history and the	**************************************	and the second of the second o	
an Branchag (1) from 19 ylang fir inn half the law ye make 19 fr an 18 million 18 am yek i syak		و به المحافظة المحافظة والمحافظة والمحافظة المحافظة المحا		k mandan kan jijik kafi ali manili safi k gafi kan afin afin afin sha sha sha sa ya mafiya sa	(x) kg_7	Andread and a stream of a part of the control of th	
ZIMPUES	JUMAKE T			$\Theta_{1}$	2, _ (		
	aper programment from a signar spin and a money considerate active place part of personal part of the property	e gyptiming og en gener på kommen er kommune og en		o buez	<u>C</u> )	نسو (۱۹۵۳ مادر در ۱۹۵۶ میداد اها مساهر در در ۱۹۵۳ میداد اها مساهر در در ۱۹۵۳ میداد اها در در در سال ۱۹۵۳ میداد	
Hu	Le 12 an	# CO	el 40	neferc	natio	N S	
	H's a d						ens.
	neres e en e				in National Association (National Association (National Association)		ar o particular formation for the contract of
CANGE S	ged, nug	Same	butacs	-4hra-	<u>2) 1</u> 1		et australiset de libraries and et travel et a statistical addition et des australises and the desired
, chore	n intre	there are a second or the property of the second of the se	MS U	DO	V +		e na politicali form milio impressamente politica (i i i i i i i i i i i i i i i i i i i
ł <b>I</b>	NU Opender		Ans 1,91	<i>w</i> > <i>c w</i>	5T F	SAID ZI	
	Oiscar adec			amentetes ( employed amente and a second and a second amend and a second amend and a second amend as a second			
for the commence of the commen				and the state of t	//		

WE HAVE A FAVORITE EXAMPLE OF THIS
Ar -> Ar + OrdGo
DOES NOT CHANGE (E) OR (B)
physical observables
ME RECHU MAY: PHYSICAL EFFECTS UND IN F= dA
"appromation of the set of the s
Alx) is a 4-ventor field
ARE CAUGO PHOTONS OF THIS FIFLD
lidentified of green's functions of matrix elements
electrons: have charge & under tems uni)  meaning it > eigodit  under uni)
Photons: unoharged (just funny empt)

-	9.1
-comparament and the state of	INTERACTIONS LEIGHT
- Company Commercial Sciences	inamina e sitganas e mamina e
dy management of the con-	Eighter Terizadus
	3
(Udige—angladge—prophere	maning anti-e
TONOTO A COTTON OF THE	( e-i i och)
Constitution of the same	
- commence and a comment	these "tegrams diagrams" enough
Address and the State of the St	quantum miteractions.
Observations of section of the spirit	
POSTERO - OFFICE OFFICE AND ADDRESS OF THE PERSON NAMED AND AD	the vertex is some point
Problem and a company	the vertex is some point in spacetime e which the
O CERTIFICATION OF STREET	interaction occurs
-	I I
Commence of Commence of Contractions	YEARTICES  MUST BE  GAUGE IMARIANT
B. CONTRACTOR AND ADDRESS OF THE PARTY OF TH	T
And other backlibrouncedings	Coops of CHARES)
ereğen telleribili mahajı	
Season seasons	
- of the park and and as a sequence	"electron i position annihilate into
-	a rugal bragos pegre
a cabellar annua annua page	bobbind pack out of LE-evendey wowelf9,
Under the second second	12 thing was sol and be willed inounally
***************************************	
***************************************	
\$	

BEMARK: the existence of the Ar (photon)

[bcol/gauge symmetry

in fact: Ar is the connection

(port of orangent derivative)

WHEN YOU MAKE TRANG FARAM WOCAL (a field), YOU MUSO BRING AT TO WID.

ALTERNATIVE VIEW: A MASSLESS PARTICLE

THAT IS A SAN-1

CAN BE DESCRIBED

BY A 4- COMPONENT

PIELD -- BUT

IT'S NOT LORENT? COVERNMY.

mourant way, need to

Mtroduces extra deg. of freedom duat you have to remove by GRUGE PIXING

-> PERMANCY IN theory,

	3 Commutates von 1827
t to the state of the light of the particular particular and the state was the state of the stat	BO(100): NON - ABERTAN
er er til til er	comultatas aport variou
a thaile an	
er er er skallen er skallen er skallen er	MORE GENERAL 0485.
- AA-Company of the Company of the C	
	FACT: GAUGE FIELDS IDENTIFIED WI ADJOINT
e. The file of the file of the section of the secti	"force mediators" representation
rom Australia (1804) egyma ki edituu ina haagiini (yayfun igir Abar) aali suu seronaassa siina ee araara	"force meginators" representation
	USUBLY: MATTER FIELDS => FUNDAMENTAL
and the second s	
	1 mateix
	A.AITIAATTA
r et la fra des la	ANTIMATTER S ANTIFUNDAMENTAL
- TO TO TO TO TO THE SECOND AND AND AND AND AND AND AND AND AND A	
	Quv. 60 () (T)
	FOR SU(2): GENERATORS ~ 5,03
	W SEE 3
	TO DATE!
	CENTER CHARLE

 MATTER: 3 of SU(3)
J DIM VECTOR SPACE:  (1) = green grack  L blue grack
ANTOMATITES: 3 of SU(3) (5)
PECME: 3.1.
GWONS: 8 of them, one for each generator.  We in the ADJOINT

...

e en	I WANT TO UNDER STAND
montos autotro de timbro territorials autorem 1900.	
	$\begin{array}{c c} & & & \\ & & \\ & & & \\ & & & \\ & & & \\ & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ &$
	- 2
n "mattha karkusususus "katthab" ("h" "dubuh dh "a sasari a 11 11 a ("h	1 Congression H
	Corse ; H.
17 MIN - 1 A - 1800 - 1804 - 1804 - 1804 - 1807 A 117 MI	
essinana, minnelling managasi katik miningkan aman jima	"A red quark ? anti-green anti-gue-k
el calcul el ser haccasalem a fasca de ses el contra de la contra del la contra de la contra de la contra de la contra del la co	"A red quark ? anti-green anti-grack interacts w) a rg gwon"
agraphic of the administration in the administration of the admini	
om _ oi se a là starronne (a cuite ce litre (a t — d)	REPS: 303 = 8 0 1
ala arillian kalilirah ("An enarraman alarante en kililik ("An ara	
Bankshi, 11 Waliot Hall Color / HAMING A.	fluxe is some overlap w)
والإسبادة إلى سريسين بوسيونام أواسيدا الأثارير بارجا	303 And the ADjoint.
Christon and State Color half application 22 States are Superior Communications.	XINTERN INCIDENT SANCE E CE
	that connects these
	reps \
	The generators themselves
~~~	
agangan par memilikasikani kan Salaiki jahah bermah sahi par Japan Salaiki bermah biri sa	mdex 11
has the state of t	for 8 mdex for 3
an distribution of the state of	Mdex for 3
tana katan mining samu na mana mana mana mana mana mana man	

Il malces ashact	
restantement the	
is a gauge munion	

if I transform, then the vertex does not to anything.

Carly 8 of these

*	A Starting	trica	for the		Adulia unity amilia, a may 30% surfaces meneralificis di Statione Africativa.	
	A starting point for the					
	byacs.					
	(THE PERIODIC TABLE) REMAY WO ( REMAY Y					
	$8 \text{ smons}  M_{\uparrow}, 5$					
	14 000000					
er a source annual source from the source of the source of the source source of the so	(2,0)	<u>SU(3)</u> >	x 80(5) x	UUDy	मान पूर्वत में पूर्व मान हुए में कहा है जो की किया है जो मान के बेट को का मान के मान के मान के किया है जो की क का पूर्वत में पूर्व मान हुए में मान है जो की किया है जो मान के मान क	
		A Progress of Survey to the spring show the survey to the survey to the survey to the survey of the		the second secon	hallada ar ann ann ann ann ann ann ann ann ann	
quaries >	= (d)	enances en		4.6	<u></u>	
				2		
	UR		a mandrall serverside the second reservers and reservers and reservers and reservers to the contract of the co	3	ona arus andrew see della dalla dalla della per della per differenta della mana della see della see della see d	
	de	3		3	s	
V	O R				tankan dalam dalam dan	
leptons 9	1 - ( De Vi)				t a Marinda da Lari da de esta da la comisión de la comisión de de constituir de la constituir de la constituir	
	L=ler)			y por programme and the contract of the contra		
er er kanna kullus kilden kennen ilmilik belg kelik er en er emili beritat besita. Vi ste	<del>C</del> r	nes a series anticides de l'est de la metrica de l'est marient de l'est manifest de l'est de l'est de l'est de	and a state of the	and the state of t	mas deille me hand de gen soo meen de lit te vijderen til fre meen flegen. Til fe selve sterne	
	CR				t and two same of Milliams come Well States and Williams States Milliams States Was and the same of a same of a	
141663	4.		2 <u></u>	naura anara en sucarrado nacionales nacionales gracas antinas contentes nacionales antinas contentes de conte	in general weight, which and the second statements of the section of the section of the section of the section	
	ELECTRIC CHAR	SE : 73 :	+ X	was low on so that it is now in low of the light product of the low of the	rr de research hann said he thanks a' stilliontaine, literature ann an thilliot a search ann	
	$\left(\begin{array}{c} v_{l} \\ \varphi \end{array}\right)$	has T	3 (VI) = (-1)	2 V <sub>L</sub> \	a kalangan kanangan	
	eg.	e ganada (1,50° a a 1,50° a a a a a a a a a a a a a a a a a a a			and the second s	
en en en en recent ar en	oon maara diinaa samana aa aa isaa daa ahaa dhaana daa ahiis 11 ka miibhad dhiilifa dhininka madhiis dhalla dhiidhadha ahaa dhiidhadha aa ahaa dhaa ahaa dhiidhadha aa ahaa dhaa ahaa dhiidhadha ahaa aha	yutoodog gaaraan ahabiyuu u ka sarar aana uu uu sarar u ka waxaa ka ka waxaa ka ka aa aa aa aa aa aa aa aa aa a	Programment of the section of the se	1999 yaga 21 martin 19 minus (martin 1904) atau 1904 atau 1904 minus (martin 1904) atau 1904 minus (martin 190	ark karamanak na miliar dikir dikilalin filom meminaka pilikanin telengga mina (() k a demand ten	

30: 3U(d) is IN FAC "electron "broken	KIND of Suce); vesk' syc	PECTRON ELECTRON	SPECIAL;
but the	w's is a . mose of	an na	i war
WHAT THE WHAT INTE	RACTIONS	ARE AU	Compo
3 2 2 2	GA - 8 920	Stener 2	
as long as	esther quan	mo mingo	os allow!
INUISES TO MB. MR ROTA BOTA NOT		Was	U(3) SINCLETS JOSNITZACZED INDEX.

and the state of the	JUKAMA COUPINGS
· · · · · · · · · · · · · · · · · · ·	nitraction ul Higgs
ood of the definition of the desirability of the definition of the second of the secon	SM-0
t et the finish and season to the second of the second second second second second second second second second	case, su(2) " 2×2=3+(1)"
and the second s	
ZY = 0	$\begin{array}{c} (Q_L)_{I}; H'(U_R)' & S_1' & S_2' \\ \rightarrow & (Q_L)_{I}; H'(U_R)' & S_2' & S_2' \\ \end{array}$
	-16 -15 5/3 / (whater) forser
i i i i i i i i i i i i i i i i i i i	
Silve of the control of the control of the land of the control of the control of the control of the control of	
1888 * William P. And M. W. Marchaell Statement on the Anti-Space (1985) and Anti-Space	ll up
на финанский «постит» а постит мер 1857 году постите и изгодитуру	Lacus L. L. Comments and Commen
ika e 1880 kita da da angili yang sayang sayan sayan mana dibada da angiliya da manakan kan kan da angiliya da	have to be some color
O TO COSTO MAIN ANN AN ANN AN ANN ANN ANN ANN ANN AN	
	Similarly &
a Mara a deli della della della martina del a della de	V (
A Constitution of the Cons	(Q1) I; H' (de) 'Si'
	-16 -12 -113 -> +0
	musciant'
	QL) 1; Ht; (de) + 8 20)
	-16 1/2 -13 -> =>
	$1 \text{ observe}: 2 = \overline{2}$
	WINANC: 2 - C
Commission and an administrating of the control of	

(OL) II & (GT) (T^) I 5 (OT) d Q 2 ) 3 i d Si su(2)

I A A A TA) I (OH) d Q 2 | Si d Si su(2)

	BONUS
	VIVITCAL
	Why 8U(8) x 5U(2) x U(1)?
	maybe these all live m a bragger, simple group?
	one condidate: 8U(5)
	g ~ (Iswall)
	$\begin{pmatrix} 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 $
	stuff in here gens u(1)
	NOT MANTIONED: CRANTY AS CAUGO THY?
26/rila/Louis resulting resulting	(1 teink)