bosons
provide
diffractive
scale
sterile
state
term
light
masses
order
values
heavy
near
seesaw
event
mixing
data
beam
model
energy
full
similar
target
first
gauge
write
group
process
since
flavour
muon
work
sector
small
effects
calculation
factors
terms
models
signal
Dark
mass
GeV
EPA
cuts
way
MeV
Eν
Lτ
νe
neutral
much
number
constraints
charged
flux
lepton
physics
portal
oscillation
DUNE
large
total
New
phase
final
νμ
neutrino
Higgs
boson
fact
left
matter
states
fields
νSTORM
space
results
scalar
decay
trident
Model
form
C.L
Uμ4
Lμ
Lα
να
ν4
via
take
must
far
Ue4
νβ
Nucl
mode
scales
possibility
assume
freedom
focus
Lagrangian
Pascoli
Muons
less
leading
νD
used
Section
interference
expect
rates
smaller
suppressed
angles
many
note
medium
leptophilic
operator
nature
Matter
allowed
impact
pair
discuss
effective
problem
Note
μν
μo
right
study
LSND
amplitude
obtained
typically
latter
use
cases
level
loop
Light
fluxes
cut
still
ones
find
violation
way
Mass
rate
νμ
νh
Uα4
Nucl
Models
Interactions
Forces
Beyond
BSM
protons
wave
pion
Oscillation
Dirac
Uαk
charge
point
provided
single
Although
anomaly
observed
bound
near
dashed
calculations
P.D.F
LAr
short-baseline
neutrino-electron
respectively
sin
cos
meson
Finally
density
around
considered
One
density
Heavy
Current
Universe
stored
provides
problem
Paull
fermion
previous
precision
invariant
massive
Current
Cross
Interactions
Electron