Quillen's Thm on T+MU

Review : Tutaos lecture

[Couplex oriented cohomology theries] >>) formal group laws] $E^*(CP^{\infty}) \cong T_*E \text{ it } F(x,y) = f(t)$ $Lf^* \mapsto E \text{ The Eix,y} D$ $E^*(CP^{\infty} \times QP^{\infty}) \cong T_*E \text{ ix } y D$

Zhipany's leture.

MU is universal among complex ordered cohomology theories

i.e., if E is a golx oriented cohomology theory

then I f: MU = E map of rly spectra

st Ex(CPO) = Toblital

to = f*(thu)

Q: 15 the fig | associated to MU universal ?

Yes! Quillon's thun on ToMU.

O Not the historical order. automishing!!

The universal for over L is studied my Lizard

Lizard VIJ.

Thm. $\Theta: L \rightarrow \pi_{\infty}MU$ is an isomorphism outline of of zeib, by: = HxMU

D. universal fight over LRecall that a fight were a commutative my Ris $F(x,y) \in R(x,y)$ sh F(x,y) = X F(x,y) = F(y,x) F(x,y) = F(x,y) = F(x,y)

F(x,y) = x+y + 5 aij xiys requirement of saij1

unlunded one: Funio over L.

i.e., given any fight of over R.

then I vay morphism, f: L > R.

St. G = fx[Funio].

 $L = 2(aij) / \sim_{E(X)} |x| = |y| = -2$ $E(x) = xey + z = aij x^{i} \hat{w} |aij| = 2(ej - 1)$

Thm. (Lizard) [= 22 x1, x2, --]

[xi=2i izo.

Reforence: Luive: s'ustes on Chromatic honotopy thosay.

Lecture 283.

(L2863)

Down Ravonel "Evelu book" A 2.1.12

Complex coborden there

and stable houston) graps

of sphere.

A2-1,10

Prop \$ = 1 = 2[b1,b2,--]

\$ @ Q is an isonorphism.

observation: ax of fgls fix,y)= xty

Given $g(x) = x + b_1 x^2 + b_2 x^3 + \cdots$ (g(x)) is invertible in). $2(b_1, b_1) - J(x)$ Then. gf(g'(x), g'(y)) is also gf(g'(x), g'(y)) is also

In particular, 9 (\$(x) + 97 (4))

over 2[b,b27--]

~ p: L > 2(b1, br. -)

Fact: in Char =0, every fge is obstained from the additive one.

Fiving) = x+1 my, a chape of coordinates get = x+ Elix

~ indicates that \$000 is an iso

Constits of abouts,
Hardar Fact. 1 Define I CL of positions clayees,

J C Zíb, -] = (b, b, -)

indecompasible part.

(I/J2)2n 2p. (J/J2)2n = 26 pn)

de is an impaction

the in-je is $\frac{p}{2}$ if $n=\frac{p}{n}$.

 $t_{\text{mu}} = t + \sum_{i=1}^{n} a_{i} \in \text{Table}_{i}, \quad \lambda_{i}$ $Claim : \quad \alpha_{i} \geq b_{i} \quad 17,$

thus thus Much - MUNE.

(MU(1) COMU) NE

Advosage: Mull) NEZ VILE 120 muco - 5 - mure JMUU) NE - MUNE bi 5 mune MUNE

MU(1) 1F = 2 = bitte, MUNG.

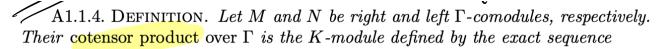
>> \$ \(\pi = \big \) \(\pi \) tom = to bititl

(3). H*MY ~ T*MY. Adam Spotral Cognence.

> Gxt & (Fp, HMU) => TIt-SMY 6 Aly mo Top

Ax dunt of steemed Alg.

= HFp+HFp = Fpish, 32,-19EI20, 47 13/1-2p-2 (Zi) = 2p'-1 Quentit Hamy = 7(b, b, -) Pr OFE.



$$0 \to M \sqcap_{\Gamma} N \to M \otimes_A N \xrightarrow{\psi \otimes N - M \otimes \psi} M \otimes_A \Gamma \otimes_A N,$$

where ψ denotes the comodule structure maps for both M and N.

Structure. How is a P_{\perp} - comodule.

Al.1.18. Corollary. Let (K, Σ) be a commutative graded connected Hopf

A1.1.18. COROLLARY. Let (K, Σ) be a commutative graded connected Hopf algebra over a field K. Let M be a K-algebra and a right Σ -comodule and let $C = M \square_{\Sigma} K$. If there is a surjection $f \colon M \to \Sigma$ which is a homomorphism of algebras and Σ -comodules, then M is isomorphic to $C \otimes \Sigma$ simultaneously as a left C-module and as a right Σ -comodule.

Chure of MY

Ext (Fp, Homu)

= Ext Ex (Fp, C) = Got (Fp, Topo C

A1.3.13. COROLLARY. Let K be a field and $f:(K,\Gamma) \to (K,\Sigma)$ be a surjective map of Hopf algebras. If N is a left Σ -comodule then

$$\Rightarrow x_1 = x_2 = x_1 + x_2 = x_1$$

$$\Rightarrow x_1 \Rightarrow x_2 \Rightarrow x_3 \Rightarrow x_4 \Rightarrow x_5 \Rightarrow$$

ph, sph;

Streend aly.

H* CPP is an A-module

Holf Alydom.

E* CPP

Holf Algebra.