

Speech for the Scottish Universities Summer School in Physics

University of St. Andrews

Scotland

August 31, 2012

I am honored that the organizers have asked me to give an after-dinner speech at this distinguished, 600 year-old university. This is truly a special year for the Scottish Universities Summer School in Physics.

Just two months ago, the discovery of a particle with “properties consistent with that of a Higgs boson” confirmed a prediction made some 50 years ago by Peter Higgs. His profound insights and those of his theoretical colleagues have guided our field for decades.

There is now strong evidence that we are on the right track in addressing the problem of particle mass, one of the deepest questions in physics. And we are no where near the end of exploiting the potential of the LHC for discovery.

This school was perfectly timed to assess what we have learned so far and where we are going. The organizers have done a splendid job in every way. We should all thank the directors: Craig Buttar and Franz Muheim and their superb organizing committee. Thanks to their hard work, planning, and hospitality, the school has been a huge success.

When Franz asked me two days ago to give this speech, I was concerned that I would not be able to offer insights of any particular value.

So I went to Sven. “Sven!” I said. How would you like to give a speech after the banquet on Thursday night? You would be perfect! No one could possibly do it better than you!”

He said, “I would really, really love to give that speech, and I know I would be perfect, but I’m so sorry, I just can’t be there.” Well that’s not quite what he said, but it’s close enough.

I then went to Bill Murray. “Bill”, I said. How would you like to give a speech after the banquet on Thursday night? You would be perfect! No one could possibly do it better than you.” Bill shook his head sorrowfully, and said. “I would just love to do it, and of course I would be fantastic, but I’m so sorry I just can’t be there.” Well, that’s not *quite* what he said, but it’s close enough.

So I asked myself, “What can I possibly add after this incredibly informative two-week course on particle physics? After some deep introspection, I wrote this short play, which offers a perspective from southern California on particle physics.

Several of our students will now present, “Higgs in Hollywood”. The play is set in a bar in Hollywood, the heart of the American movie industry.

Allow me to introduce the players:

First, the Bartender, played by Mark Dunser;

The neutralino, played by Ulisses Saldana-Salazar. You will need to pretend that the neutralino is invisible;

The Z boson, played by Mark Zoller;

The Higgs boson, played by Tien-Tien Yu;

and Peter (you know who), played by Maik Hoeschele.

Certain of these particles will decay during the play. Please take appropriate precautions.

Higgs in Hollywood

by

Jeffrey Richman

August 30, 2012

Characters:

- 1) Narrator
- 2) Higgs boson
- 3) Z boson
- 4) Neutralino
- 5) Bartender
- 6) Peter Higgs

A Higgs boson, a Z, and a neutralino walk into a bar in Hollywood.

The bartender says, "What can I get you two?"

"You should have asked, 'What can I get you *three*?'"—said a tiny voice. It was the neutralino, a little bit of dark matter.

The bartender looks all around the room. He sees nothing in the place where he thought he heard the voice coming from. Then he hears the little voice again.

"Hey, bartender! Over here! Give me a glass of your best whiskey. It's no fun being invisible when you have to account for a quarter of the energy density of the universe. I don't get *any respect*! In fact, I want to see some *real gratitude* for keeping those galactic rotation curves up to snuff! How would

you feel if everyone ignored you for all of recorded history! Oh, I get ill every time I think about the photon – so much credit, and for what? The sun? Get serious!" He pauses, then slowly lifts his eyes upward. His arms outstretched, he says, "To be immortal and yet invisible: why me?"

"OK, OK says the bartender. I think I understand how it feels to be ignored by everyone." He pours a glass of whisky, puts it on the bar, and slides it expertly in the direction of the tiny voice. The whisky quickly drains out of the glass into thin air.

"What about you?" The bartender looks at the Z boson. "What will it be? You look like a vodka type to me."

"Oh...I'm feeling so FAT! Shouldn't have eaten that Goldstone boson. Couldn't resist breaking that symmetry. It was so...spontaneous. Before you could say 'broken generator' I had gained 90 GeV! I used to be massless, but I just can't get rid of this weight! Plus, my spin degrees of freedom will NEVER be the same. My longitudinal component is REALLY conspicuous. Is it showing? How embarrassing! Well, I am in Hollywood. Maybe I should get liposuction. Helicity zero! – that is so...rho meson! Oh...I could just decay right here on the spot! Goodbye cruel world!"

The bartender nods sympathetically and turns to the Higgs boson. "How about you? You look like a pretty massive particle yourself! Ha ha!"

The Higgs replies, "HELLOOOO! AS IF! I am, like, totally spinless at what you just said! All of my hidden valley-girl friends are going to say what a moron this bartender is.

"How DARE you call me that!" the bartender says. "I'm NOT a moron -- I'm a moronino! Don't you KNOW THE DIFFERENCE!"

I bet you don't even know a Majorana spinor when you see one.

"WhatEVER", says the Higgs boson. But then she begins to cry.

"He's right -- I am heavy. Sooo...(she sighs) HEAVY. Right up there on the electroweak scale. Wow. Not only that, the vacuum just isn't what it used to be back in the early universe. The neighborhood has really gone downhill -- I mean the Higgs potential has fallen to a new low. Really disgusting! Could someone PLEASE TURN DOWN THE VACUUM QUANTUM FLUCTUATIONS? This fine tuning is KILLING me. I can barely keep my mass under control. Could somebody come along and stop this madness? Pretty soon my GUTS are going to weigh as much as a gauge boson at the unification scale! Where are Weightwatchers when you need them?

A distinguished looking gentleman enters the bar. The Higgs boson looks up.

"OMG, it's Peter, my agent! He's soooo cute!"

She runs up to Peter and gives him a huge hug, which he is somewhat reluctant to accept.

"Peter, come sit with your favorite client! You're looking good, Peter! How is life? Now that my talent has been discovered, I'll bet you're sitting pretty! Learning a bit of Swedish, eh? You are so lucky to be my agent. It's a win, win situation. You and me. Me and you."

She takes Peter's left hand, and holds it tightly in both of hers.

"Now Peter, I don't want to complain. The LHC job was good while it lasted, but, frankly, I need to move on. This is not all about your theories, as lovely as they are. Life is short. Very short. So do tell. Are there any exciting new jobs out there for me?"

“Being the most important manifestation of electroweak symmetry breaking isn’t enough?” says Peter. “I thought that was a pretty good role for you.”

“Peter. ...Peter. I am not ungrateful for all that you have done. But, a particle like me, well, you know, ...needs an interacting job. And Hollywood should be just the place. I’ve heard that there are interacting studios all over the place. “

“Well, I’m not so sure they have any roles for you right now. The economy isn’t so good. And I have to tell you. I have four other Higgs bosons now lined up as clients, and they have some absolutely *super* skills. One of them is CP odd! And I think that a couple of them can really charge up an audience.”

The Higgs looks dejected. “But Peter, I know I can interact. True, its been a bit *weak* so far, but I’ve been thinking about increasing my coupling strength. I hear there are doctors here who can do *anything*.”

The Z boson can’t take it any more. “This is *too* much. Ms. Higgs boson here thinks she has all the talent. She thinks she can just change her coupling strength. Ridiculous! I am outta here.”

The Z decays into two neutrinos, which immediately leave the bar without paying for the vodka. The neutralino drifts through the wall, out into the streets of Hollywood, and from there to the cosmos.

“Good-bye, Peter,” says the Higgs. “Here’s to you. You predicted me! You said I would be great. You were *so* right!”

Suddenly, in a blinding flash of light, she decays into two photons.

The bartender says to himself, “At least she went out with a rare decay. She would have wanted it that way.”

The bartender turns to Peter, who is the only one left in the bar. "I guess you're the one who has to pay up. That'll be 125 ± 1 dollars."

Peter pulls out his wallet and pays.

"Thank you, Peter," said the bartender, "you're the best."

THE END