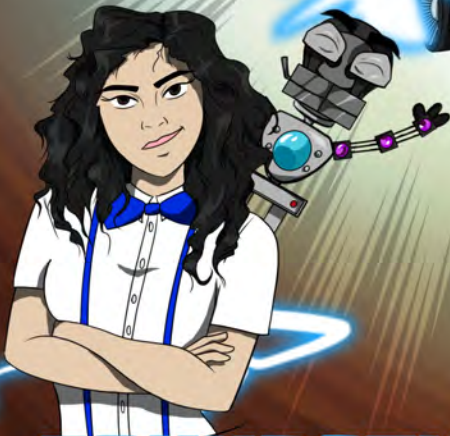


OPTOSIGMA COMICS

PROJECT AVATAR II

VOL. 1

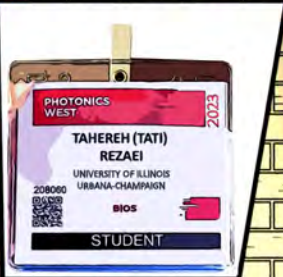
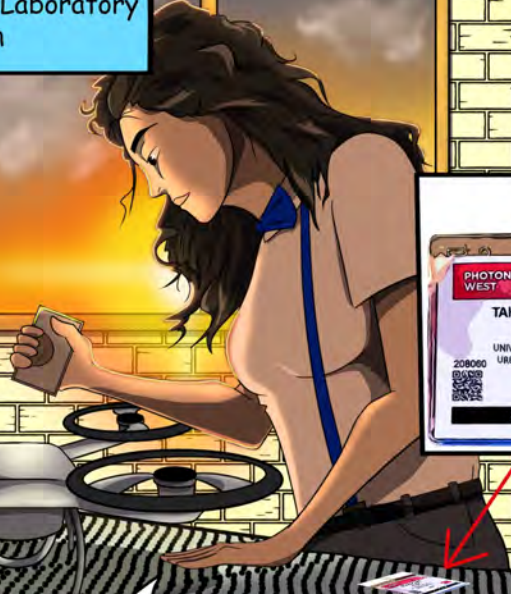


FOUNDATION OF THE NEXUS

Professor Paul Kwiat's Quantum Optics Laboratory
University of Illinois Urbana-Champaign



Wow! I still can't believe that they gave me this really cool mirror mount for free!



OK - Now the last step...I'll place the mirror into the new MHV mount, align the system, and install it in the Quantum drone.



Holy cow! The Quantum communication* system is powering up all by itself!!! I better get Professor Kwiat...



* Quantum communication takes advantage of the fragility of quantum states to protect data and transfer information securely between remote locations. By the very nature of quantum physics, the act of making a measurement of one of the entangled quantum particles causes the other to collapse into a definite state. This makes it impossible for a hacker to read the communication without leaving a tell-tale sign that the message was intercepted.



BLAM!

Professor Kwiat! I just installed the mirror mount we got from OptoSigma at the Photonics West expo and put it into the drone. It's doing somet...

Tati...why are you bursting into my office?

Amazing! The entanglement* source is running, and we didn't turn on the pump laser? We better figure out what's going on!!!

The system turned itself on all by itself. It's making entanglement and I didn't do anything!!! Oh yeah... And the whole thing is **GLOWING!!!!**

Quantum Entanglement occurs when two particles are connected/linked to one another no matter how far apart they may be. If (for example) two photons – particles of light – are entangled, neither has a definite polarization, but they are guaranteed to be opposite, i.e., if one were measured to be vertical, the other would be horizontal. Such quantum correlations form the foundation of both quantum computing, communications, and metrology.

Tati, is that the mount you just got at Photonics West? It's GLOWING!!!

ZAP!

Yes professor, I know! That is what I was trying to te....

We had better call OptoSigma!



Hi Cindy, this is Tahereh Rezaei from University of Illinois Urbana-Champaign. I'm here with Professor Paul Kwiat.

Hi, this is Cindy...



Oh... hi Tati! I remember you from Photonics West. How is that mirror mount working out?

The MHV mount you gave us is glowing...and when I installed it into our new quantum communications drone, the system powered on and started producing entangled light all by itself!


Well, that's the reason we are...




"Oh crap! It's starting..."

It's GLOWING??? OK, let me talk to the team. We will send someone out there ASAP!







Scott...It's starting! I just got a call from Professor Paul Kwiat's lab in Illinois. I gave Tati Rezaei - an MHV mount at Photonics West. It started *GLOWING* when they put it into their system, and now the experiment is running all by itself!!!



Oh crap! This is a nightmare! OK - let's get someone out there to clean up this mess and make sure that no one else finds out about our little alien secret!



Make sure to bring some PA pins to give to Tati and Professor Kwiat - in case we need to tell them the secret.



Ok - I'll grab Professor Rick and get out there ASAP!

Why doesn't anyone ever come into my office with good news once in a while!?

Meanwhile at Professor's Ricks House




Professor Rick, Look! Marty has a skateboard just like intern Kevin...but this one doesn't have wheels - it flies! So cool! I must get one for Kevin...

Kazu, are you watching movies again? Hoverboards are not real, and you can't time travel in a car...





Aaahhh! Great Scott!
You scared the BEJEEZUZ
out of me Cindy!
What's wrong?



Sorry Rick, we have a huge problem!
Some of the parts we gave away at
Photonics West this year are glowing... and
one of them came alive in a Quantum
Optics laboratory in Illinois.

Seriously! The boss asked
us to get over there
ASAP to clean things up.



WHAT???



* Wormholes are theoretical tunnels through space that create a "shortcut" from one place to another. Wormholes are mathematical solutions to some problems in general relativity, but have not yet been observed in reality.

Kazu, you must go with Cindy and Rick and make sure that they don't destroy the experiment. We need to help the Humans develop free-space-optical Quantum Entanglement technology to synchronize the Atomic Clocks* in each of the 12 segments of the Gate Ring constellation. They will never be able to open the wormhole* to help us escape without it!

* Atomic Clocks are super accurate timepieces that use the oscillations of the electrons around the nucleus of an atom to keep time, rather than the movement of a mass or a spring in a more traditional clock mechanism. Atomic clocks consist of a quartz oscillator tuned to match the relaxation/excitation frequency of electrons in the valence band an atomic element (for example 9,192,631,770 Hz in Cesium atoms). A detector measures the number of electrons in the higher energy state vs the lower state and adjusts the quartz crystal oscillation frequency slightly to keep accurate time. From GPS to Telecommunications, Atomic clocks have become very important in everyday life. Synchronizing them is a major challenge.



OK, Don't worry Shiori. I will help.

A few hours later...



Hey Rick, I know we are in a rush and all, but I'm totally dehydrated from the flight. Let's stop and get some water, OK?

No problemo Cindy! I picked some water up when you were getting the rental car. It's in my backpack.



Kazu! What are you doing here? You are supposed to stay hidden!

KAZU! Oh man this day keeps getting better and better.





I sorry Cindy and Rick. Shiori said I have to come. She says that Humans need Quantum Entanglement to synchronize the atomic clocks in the Gate Ring.

Kazu, what is the gate ring? Is that why you are helping all of these Professors with their work?

Yes! Shiori created me to help. She says we need Humans to build a big machine in space to open a wormhole. Human technology is not advanced enough...so I help!



Looks like we found the right place!

Yes, there is Tati and Professor Kwiat. Kazu please try to stay out of sight... We know Shiori has you on a mission, but we don't want to scare the BEJEEZUS out of Tati and Paul.

BEJEEZUS???



Yeah...I'm stealing that one from you... It's funny.



Hi Tati. This is Rick Sebastian. We came as soon as we could to help. Where is the MHV mount?



Hi Cindy, Hi Rick. This is Professor Paul Kwiat, my boss. The mirror mount is on the drone.



The polarization* entanglement source is running without any pump laser-, which should be impossible - it violates energy conservation, and we can't control the drone.



Let's grab the drone and we can take it apart!



I'll get it!

* Light can have different Polarization states, and these states can interact with atoms & molecules in certain conditions. Quantum communications technology uses different states of polarized light (horizontal, vertical, diagonal, anti-diagonal, circular right and circular left) to encode quantum bits, a.k.a. "qubits". In a typical entanglement source (like the one used in some of the experiments that were awarded the 2022 Nobel Prize in Physics), a high-energy pump photon is split into two entangled daughter photons that share its energy.



Yes, they are so cute! I just couldn't leave them home alone. Besides, they would wreck your apartment without supervision!



You brought the CREW?



No, I am Avatar for Shiroy. I come to help.




Aaah! What's that???



Look!!! Over there is Delorian! It makes perfect platform for other side of quantum entanglement link. Let's put quantum receiver on Delorian to talk to drone. It will be just like in the movie!



Are you a robot?



CINDY!!
GET IN!

Got it!!! Now we can take everything back to the lab and complete the experiment.



Let's turn on the laser and see if we can get genuine entanglement-enhanced clock synchronization.

It works! We have synchronized clocks!



Ok. I need to catch a plane to Munich. I must go to the Laser World of Photonics conference and meet with Guy & Axel. Kazu, you and the crew better come with me. But keep out of sight. Before I go though, I need to swear you guys into secrecy about Kazu and the crew.





Cindy, what is this twisted bread treat?



Kazu, that is a pretzel. It is a tradition for OptoSigma to give pretzels to our guests at the Laser World of Photonics conference. This is a Bavarian specialty. Now go hide so no one sees you! After the show, we can go to a beer garden and I'll buy you a Gingerbread heart. This is another Bavarian tradition.

 **OptoSigma**[®]
www.optosigma.com



Whoa! What is this? An awesome display of our component parts!



Sorry Guy, Sorry Axel! This is Kazu. He is an Avatar and he is alive. I brought him with me to keep him out of trouble. Don't tell anyone about him! Now that you know though, you need to wear this pin so that others who know about Kazu and his crew know you know also!





www.optosigma.com/comics



Look Cindy!
there is CEO
Scott and CEO Guy!

They are with
the top managers
at SPIE. We must
talk to them.

we need to make
technology move faster!



SPIE
can help!

