

THE AMERICAN PHYSICAL SOCIETY INTRODUCES

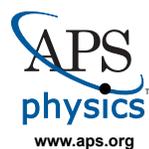
**PHYSICSQUEST 2009**

# SPECTRA™

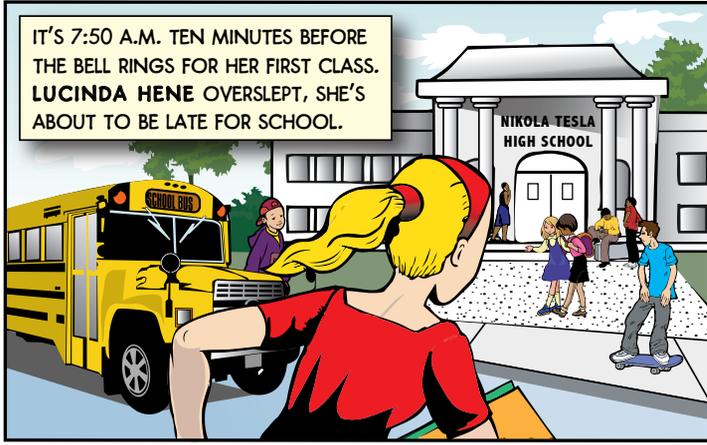
THE ORIGINAL  
LASER SUPERHERO



**A fun and  
educational  
resource for  
middle school  
classrooms!**



**Written by Rebecca Thompson-Flagg  
Illustrations by Kerry G. Johnson**



IT'S 7:50 A.M. TEN MINUTES BEFORE THE BELL RINGS FOR HER FIRST CLASS. LUCINDA HENE OVERSLEPT, SHE'S ABOUT TO BE LATE FOR SCHOOL.



SHE MADE IT! SHE EVEN HAS A FEW MINUTES TO HANG WITH HER PEEPS AT THE USUAL SPOT.

**THE FRONT HALLWAY LOCKERS**



IF YOU WANT TO BE IN THE MIX AND GET THE LATEST SCHOOL GOSSIP, YOU'VE GOT TO BE IN "THE FRONT." LUCINDA'S SPOTS HER CREW.

**KAS**  
HE'S A CHARMER; MR. POPULARITY. BUT IT DOESN'T GO TO HIS HEAD. LOVES TO PLAY HIS GUITAR WITH HIS GARAGE BAND.

**RUBY**  
LUCINDA'S BFF. SHE WANTS TO BE AN ARTIST.

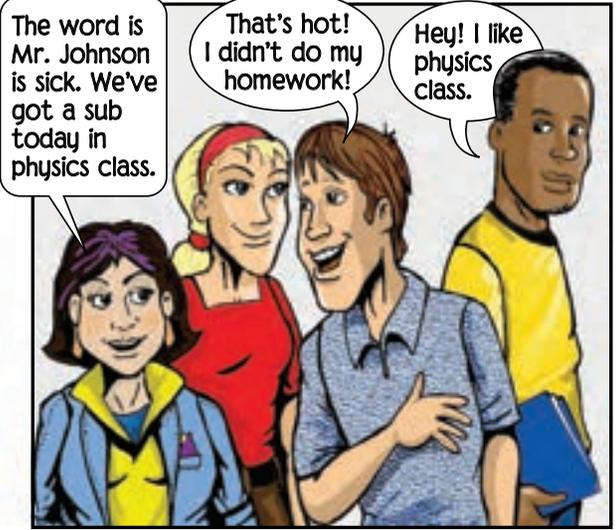
**GORDY**  
HE'S A SUPERSTAR ON THE FIELD AND IN THE CLASSROOM.



Look who decided to show up to school.

Whazzup, Lucinda?

Okay, I get it! I overslept, but I'm here now. What did I miss?



The word is Mr. Johnson is sick. We've got a sub today in physics class.

That's hot! I didn't do my homework!

Hey! I like physics class.



Welcome students! My name is Miss Allen. I'll be taking over your physics class until Mr. Johnson returns.

G-MAN, we're all aware of your "fondness" for physics and sports.

But do you want to know what I like?

I like our sub! Wow!

After reading over your teacher's notes, it looks like you guys are studying about the importance of lasers.

That's an interesting and exciting topic. What do any of you know about lasers?





Our modern world would be completely different if physicists Arthur Schawlow and Charles Townes\* hadn't developed the science behind the laser in 1952. The laser has become an indispensable tool in our daily lives. Let's look at some amazing laser innovations.

\* Schawlow and Townes constructed an optical cavity by placing two highly reflecting mirrors parallel to each other and positioning the amplifying medium in between.

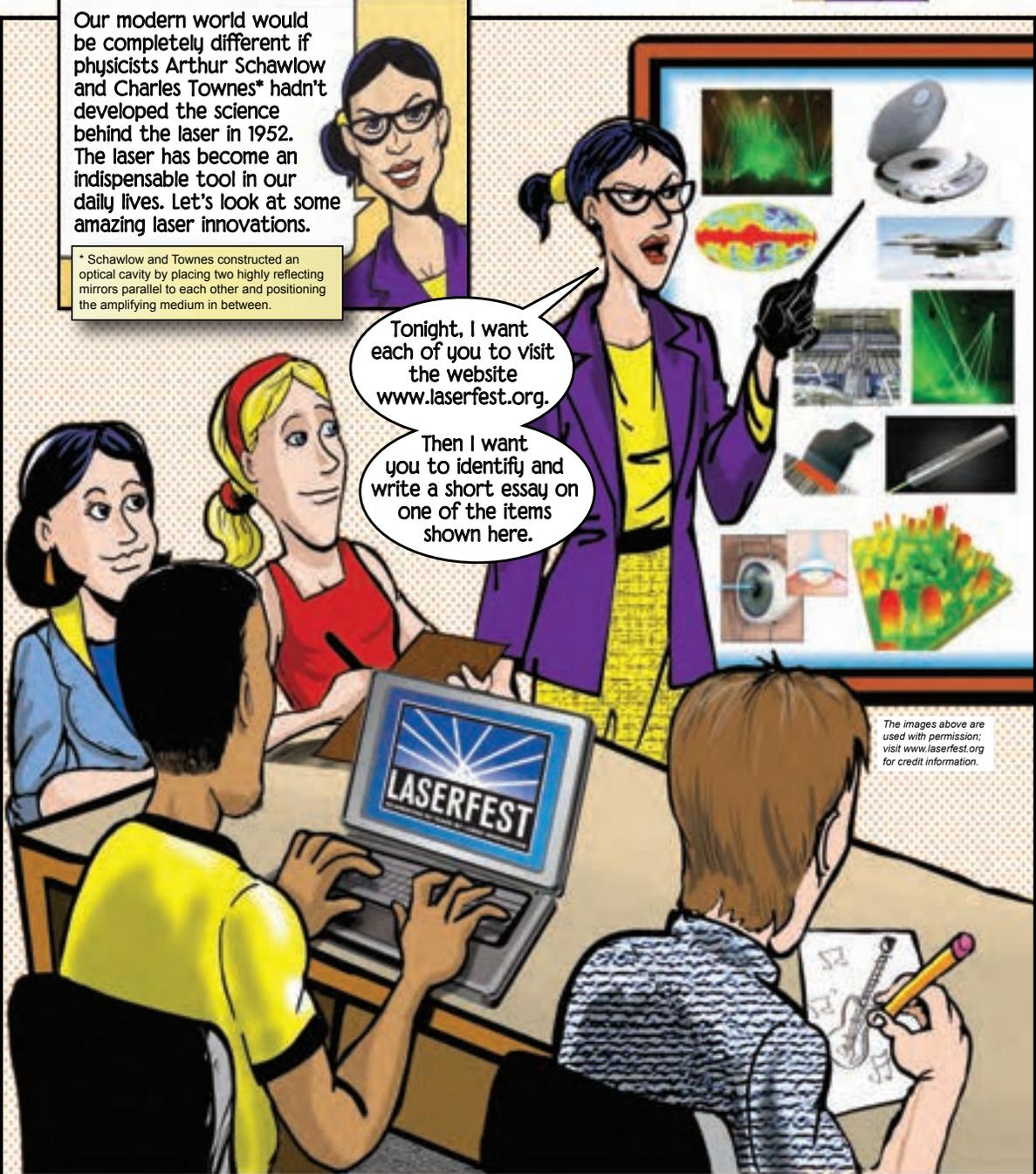


Tonight, I want each of you to visit the website [www.laserfest.org](http://www.laserfest.org).

Then I want you to identify and write a short essay on one of the items shown here.



The images above are used with permission; visit [www.laserfest.org](http://www.laserfest.org) for credit information.





Lucy, listen to this CD. It's me and my band.

OK, But don't get me in trouble, again.

You students in the back! I'm sorry that I'm "boring" you with my laser talk!

But I do need for you to pay attention to the class lecture!



Kas! It's starting to play! What type of CD is this?

Whoa! I don't know. I just burned it like I've always done before.



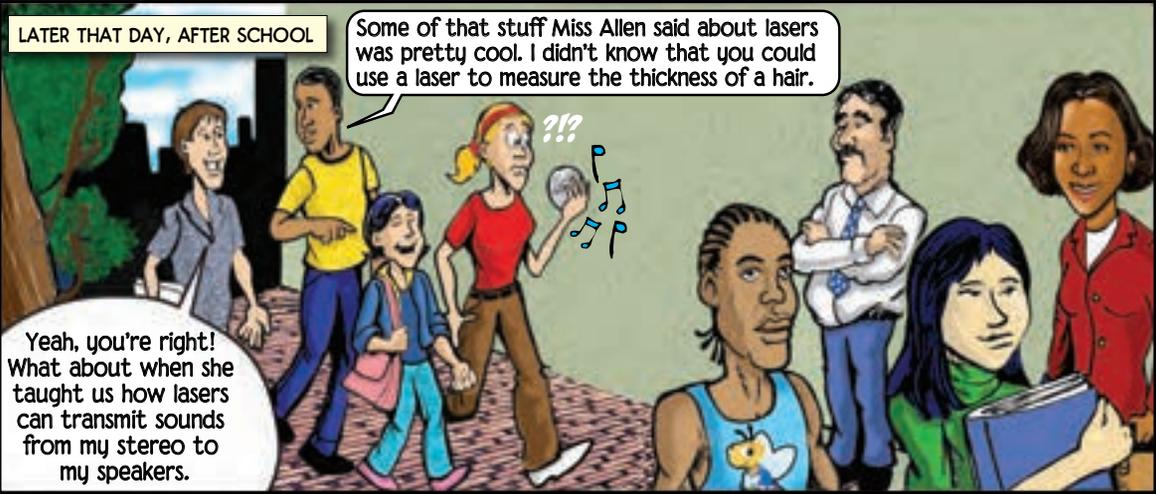
AFTER BEING A BIT STARTLED, LUCY THROWS DOWN THE CD; GETTING THE ATTENTION OF THE CLASS.

HA!

giggle! HA! HA!

THE CLASS LETS OUT A HUGE LAUGH. MISS ALLEN IS **NOT** PLEASED.

Lucinda! As fascinating as you think your "love" life is to you, I need you to pay attention in class!



LATER THAT DAY, AFTER SCHOOL

Some of that stuff Miss Allen said about lasers was pretty cool. I didn't know that you could use a laser to measure the thickness of a hair.

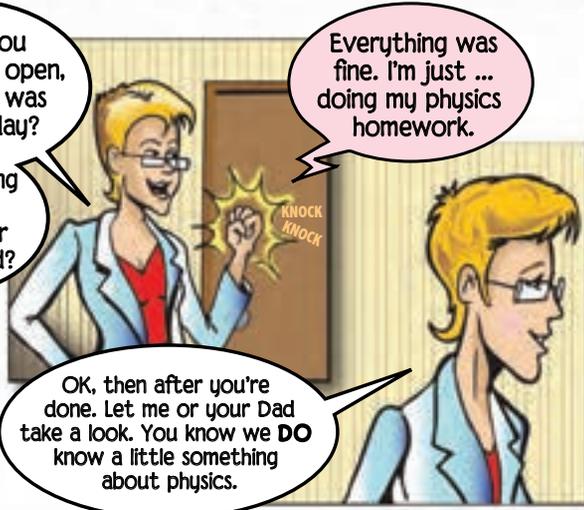
Yeah, you're right! What about when she taught us how lasers can transmit sounds from my stereo to my speakers.

Lucinda arrives home and dashes up to her room; faster than she ever has before.



Lucinda you left the door open, again. How was school today?

Is everything all right? Why is your door closed?



Everything was fine. I'm just ... doing my physics homework.

OK, then after you're done. Let me or your Dad take a look. You know we **DO** know a little something about physics.

Lucinda pulls out one of her favorite CDs. As she touches the CD, it starts playing. She's puzzled and shocked. But she still thinks her new "power" is pretty cool.

How is this CD playing?

Now I don't need to buy any more batteries for my CD player. SWEET!

KNOCK! KNOCK!

Lucinda, your mother told me that you were home. How's the homework coming?

Are you listening to your CDs or working on your homework?

Actually, I'm doing a little bit of both.

Huh?!?

Okay, finish up, dinner's ready.

I'll be down in a minute.

What's this I hear that you're studying lasers in physics class?

Yeah, we had a substitute. She gave us a long lecture about lasers and stuff.

... and stuff? Please use your vocabulary.

Lucinda begins to tell her parents about Miss Allen and all the information that she learned that from the class. She then asked them to explain how lasers work.

First, Ruby tried to embarrass me in front of Miss Allen when she told her about you guys being physicists.

We also learned that lasers can play CDs and DVDs.

And we also learned that different colored lasers have different energies, And did you know that light can bend when it goes through objects such as glass.

I'm done. May I be excused? I have to finish my homework.

She's up to something.

Definitely!

Hhhmm.... I know that I can play CDs. I wonder what other powers I may have?

*zoom!*



Lucinda begins to explore her new powers. She quickly flies across her room....

She reflects off the mirror...

... bounces off the wall, to her hanging lamp; then gets redirected towards the mirror.

**PLING!**



... and right into her fish bowl.

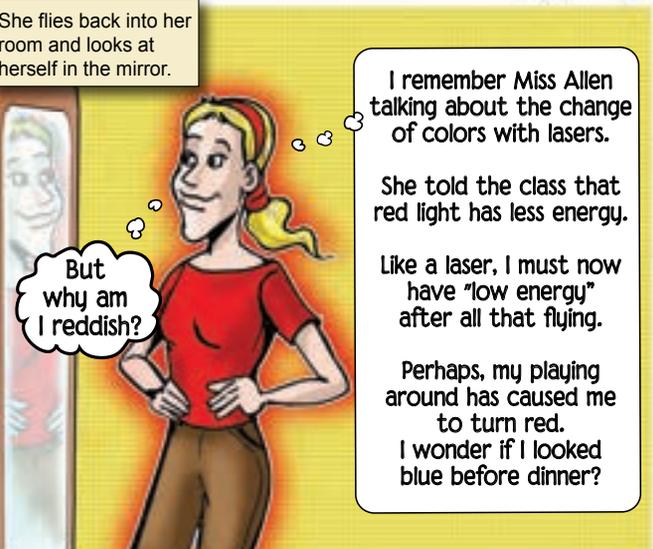
oh, oh!  
This is going to hurt!

**WOW!**  
That wasn't so bad. I've gotta try that again.

This time with more control, she runs toward her window.

She goes through the window.

Yet, instead of getting wet, Lucinda goes completely through the bowl.



But why am I reddish?

I remember Miss Allen talking about the change of colors with lasers.

She told the class that red light has less energy.

Like a laser, I must now have "low energy" after all that flying.

Perhaps, my playing around has caused me to turn red. I wonder if I looked blue before dinner?



**SWEET!**  
No more doors for me!

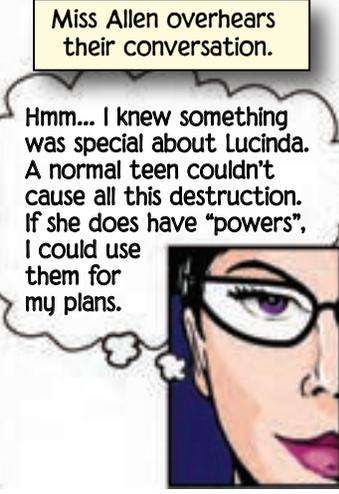
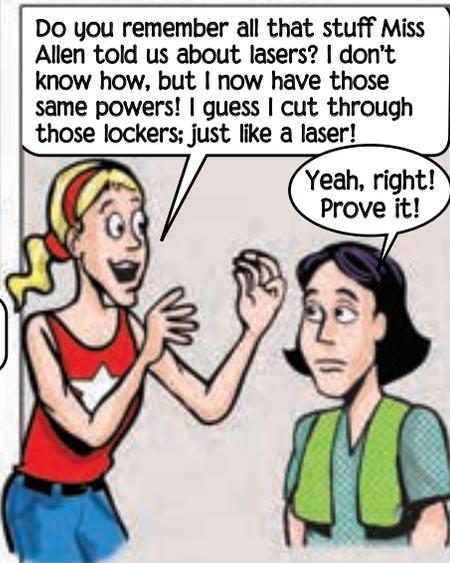
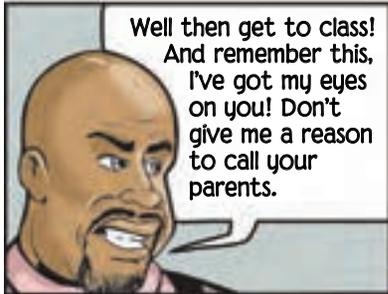
This is amazing! My body now plays CDs. I can go through windows, reflect and move super fast!

It seems that that I have the powers of a laser!

Lucinda realizes that she's really exhausted and falls asleep. She dreams of saving the world with her new laser powers.



THE NEXT DAY, BACK AT SCHOOL



Lucinda tells Ruby about the night before and what she discovered about her new laser powers. She then demonstrates her powers to her. Ruby's startled and excited. Once again, Lucinda makes it clear that Ruby shouldn't tell anyone.



LATER THAT DAY AFTER SCHOOL, LUCINDA AND THE CREW GO HANG OUT AT THE PIZZA JOINT.



I'm just checking to see if my band got that gig that we auditioned for last week. Did you like the CD I gave you?

It was HOT! I loved it!

Ruby, at tonight's football game, after I make a touchdown I'm going throw you a shout-out! Is that OK?

Ahh, aren't you cute.



WITHOUT BEING NOTICED, MISS ALLEN HAS FOLLOWED LUCINDA AND HER FRIENDS TO THE RESTAURANT.

There they are. I wonder if there's a way to find out how she cut apart those lockers at the school. If I'm correct, I could use her for my experiments!

Lucy, I know that you think your parents are nerds, but I've always liked them.



Stop trying to be funny. But if you like them so much, come over to the house this weekend. We're having cookout!

Can I come? Me, too!

MISS ALLEN RETURNS TO HER DOWNTOWN HIGH-RISE CONDO, BUT INSTEAD OF FURNITURE, BUT INSTEAD OF FURNITURE, IT'S FULL OF HER LASER EXPERIMENTS. IN THIS SECRET LAB, SHE RELAXES AND REVERTS TO HER TRUE IDENTITY.

Everyone at that school accepts me as Miss Allen. But soon the whole world is going to know me as...

# MISS ALIGNMENT

...the greatest laser scientist of all time!



I have contributed all my knowledge to laser research, yet, I still get no RESPECT! But that's going to change, after I get my hands on that girl and harness her power.

I can use her to power my super laser captivator. After it starts to work, I will be able to control and turn off everything in the world that uses laser technology.

Without lasers, the world will be thrown into chaos. Then Miss Alignment will come in and save the day.

But first, what can I do to control Lucinda's powers? I've got it! I need to control her silly friends!

MISS ALIGNMENT AKA "MISS ALLEN" WORKS ON DEVELOPING HER RELATIONSHIPS WITH EACH OF LUCINDA'S BUDDIES AS A FRIEND AND MENTOR. THEY SLOWLY BEGIN TO TRUST HER.

SHE WEARS SOME OF RUBY'S CUSTOM FASHION DESIGNS.



SHE PRETENDS TO LIKE KAS' BAND MUSIC.



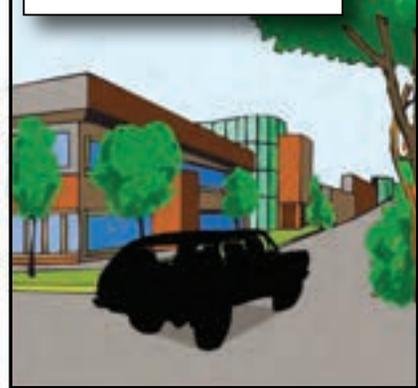
SHE HELPS GORDY DEVELOP A BETTER TOUCHDOWN PASS.



MISS ALLEN GETS TO BE KNOWN AS THE "COOL" TEACHER! ON THE DAY OF THE BIG SWIM MEET, SHE VOLUNTEERS TO GIVE THE UNSUSPECTING TRIO A RIDE TO GO WATCH LUCINDA COMPETE!



AFTER GETTING INTO THE SUV, MISS ALLEN LOCKS THE DOORS AND TELLS THEM TO MAKE CERTAIN TO PUT ON THEIR SEATBELTS. THE FRIENDS DO AS INSTRUCTED.



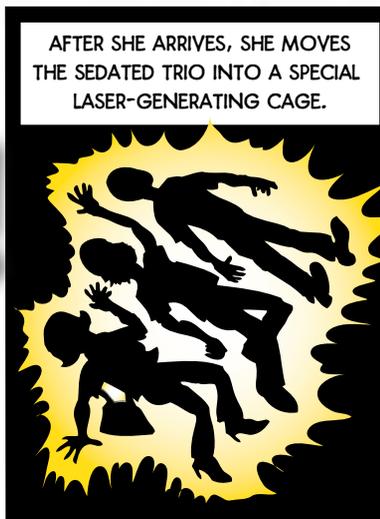
AFTER EACH CLICK OF THE BELT, THEY ARE ZAPPED BY THE RIGGED SEATBELTS.



SHE HURRIEDLY TAKES HER "CAPTIVES" TO HER SECRET LABORATORY NEAR THE LAKE.



AFTER SHE ARRIVES, SHE MOVES THE SEDATED TRIO INTO A SPECIAL LASER-GENERATING CAGE.



MISS ALLEN KNOWS HOW MUCH LUCINDA CARES ABOUT HER FRIENDS, SO SHE SENDS HER A "FRIENDLY" TEXT MESSAGE.

I HAVE YOUR FRIENDS! LET'S SEE IF YOUR "LASER" POWERS CAN SAVE THEM! MEET ME @ THE CAVE BY THE LAKE!  
- MISS ALIGNMENT



THEY'RE UNCONSCIOUS! MISS ALIGNMENT KNOWS THAT HER PLAN HAS WORKED!

**ZAPZ!**

AT FIRST LUCINDA THINKS RUBY IS PLAYING A PRANK ON HER. SHE CALLS HER BACK. SHE REPLIES TO MISS ALIGNMENT'S TEXT.

LUCINDA GETS A NEW "PHOTO" TEXT MESSAGE. IT'S HER FRIENDS.

*It's not a joke!*

And who is this "Miss Alignment?"

LUCINDA NOW REALIZES THAT SHE MUST SAVE HER FRIENDS. BUT SHE DOESN'T WANT ANYONE TO RECOGNIZE HER WHILE SHE'S LEARNING TO CONTROL HER NEW POWERS. SHE RUSHES HOME AND GOES DOWN TO HER PARENTS' LAB FOR ANYTHING SHE CAN GATHER TO HELP RESCUE HER FRIENDS.

SHE FINDS SOME OF HER OLD CAMPING GEAR!



SHE FINDS HER HIKING BOOTS.



SHE GETS A "LASER" DECAL FROM ONE OF HER MOM'S EXPERIMENTS.



AND LASTLY, SHE FIGURES OUT A WAY TO CONCEAL HER FACE.



NICE! I like it! But what do I call myself?



Wait a minute. I have the powers of a laser and light. I've got the perfect name!



Shooting Star? Nope, I don't even play basketball.



Laser Girl? Naw, that's dumb.

SuperGirl? Nope, that's already taken.

**WATCH OUT WORLD, HERE COMES...**

**SPECTRA**  
THE ORIGINAL LASER SUPERHERO

SPECTRA'S FLIES TOWARD THE ADDRESS FROM THE TEXT MESSAGE. SHE QUICKLY DISCOVERS FLYING ISN'T AS EASY AS IT LOOKS IN COMIC BOOKS!



IT WAS A "BUMPY" RIDE. BUT SHE GETS THERE!



I hope that I'm not too late.

SPECTRA ENTERS THE CAVE.



SPECTRA LOCATES HER FRIENDS INSIDE A LASER GENERATED CAGE.



I'm here to rescue you guys! Your friend Lucinda called me.



Thanks, but who are you?



I'm **SPECTRA!**

You're inspector; inspector of what?



NO! I said, *Spectra!*

Oh!

SPECTRA LOOKS AROUND AND SPOTS THE MAIN CONTROL SWITCH ON THE OTHER SIDE OF THE ROOM. BUT TO GET TO THE SWITCH, SHE MUST MANEUVER THROUGH THE DANGEROUS OBSTACLE COURSE SET UP BY MISS ALIGNMENT TO CHALLENGE SPECTRA'S LASER POWERS.

USING HER LASER POWERS, SPECTRA TACKLES EACH TASK.



She cuts through a solid metal door

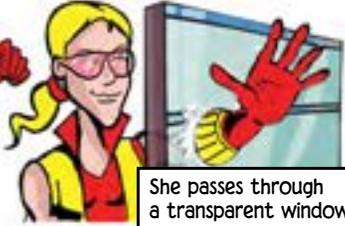


She changes her wavelength color and appearance and blends into her surroundings

Hmm... it seems that I was right about Lucinda's powers or "Spectra" if that's what she's going by now!



She discovers a new power, "diffraction", which makes her split into several copies of herself.



She passes through a transparent window

After shutting down the lasers, Spectra rescues her friends.



Are you guys OK?

We're fine. But what about her?

Who?

Miss Allen is really **Miss Alignment!**

Not so fast little girl! Why do you think I kidnapped your friends and brought you here. I needed to see your **POWER!**



Miss Alignment quickly switches the cage's lasers back on!

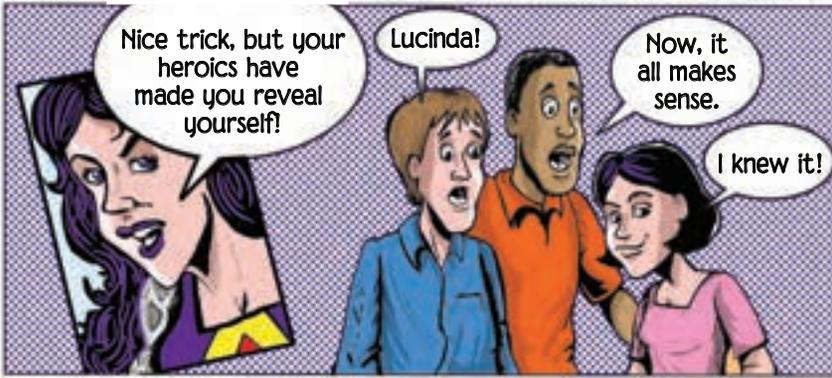
I know that you think I'm small, but I have powers you can't believe!



Spectra tosses her goggles to Kas and yells to him to use them to deflect away Miss Alignment's lasers.



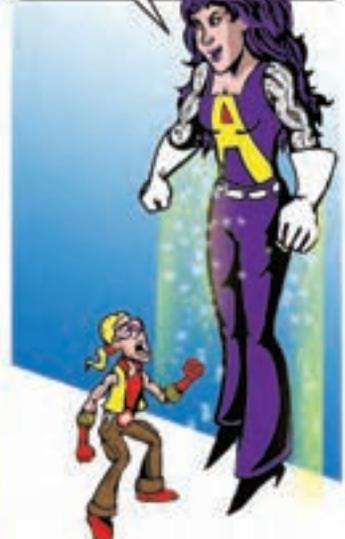
Wow! That worked!



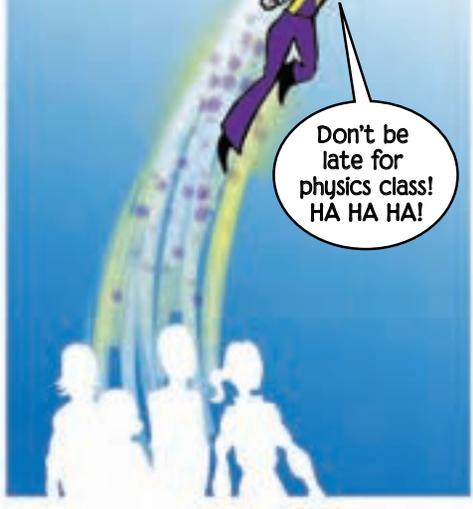
Enough with the reunion show! You may have won this first round. But now I know what you can do with your powers.



Take my word for it. You and I will meet again. I need to use you to complete my ultimate laser experiment.



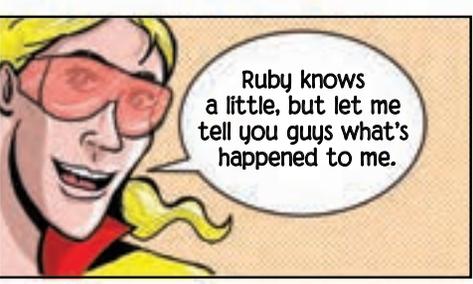
MISS ALIGNMENT SHINES A LASER POINTER INTO THE QUARTET'S EYES; TEMPORARILY BLINDING THEM AS SHE ESCAPES!



I'm glad that you guys are safe. Let's get out of here!



Lucy, you've got a lot of explaining to do.



Ruby knows a little, but let me tell you guys what's happened to me.

AS THEY HEAD HOME, LUCINDA TELLS THEM ABOUT HER POWERS.



But what do you think Miss Alignment meant when she said that she wants to use you? I don't know?

AT AN UNDISCLOSED LOCATION.



Lucinda Hene and her laser powers are the final componets needed for my super laser captivator to function! She passed all my tests, I now know her strengths and weaknesses! I can't wait until we meet again! I have special plans for SPECTRA!.



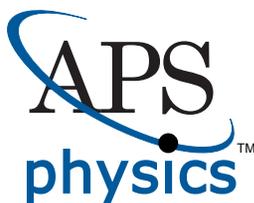
**HA! HA! HA!** To Be Continued...

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