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SPECTRA

SUPER SPECIAL

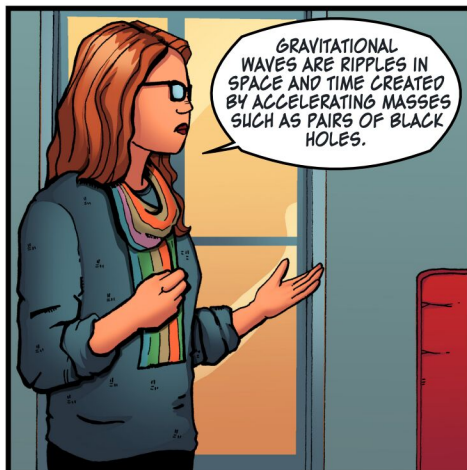
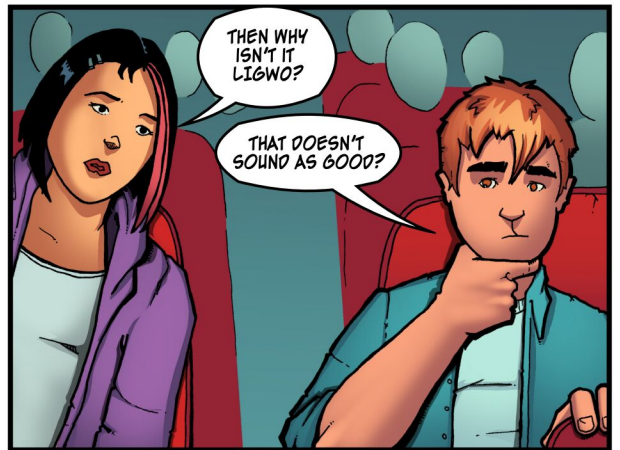
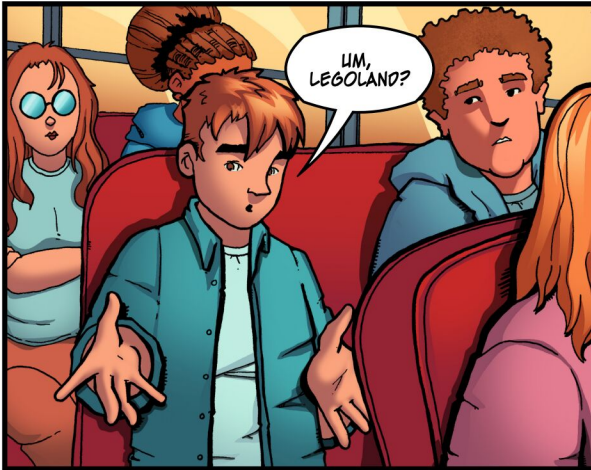
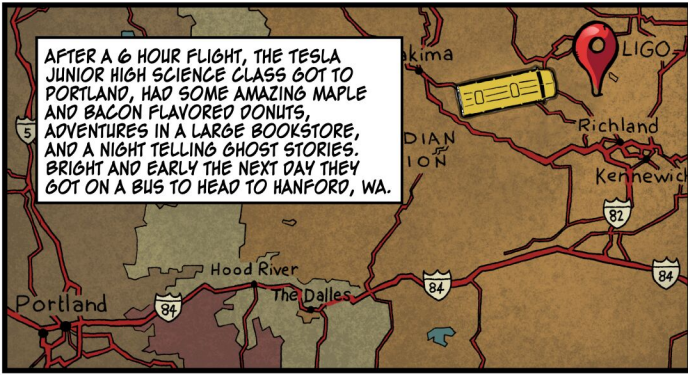


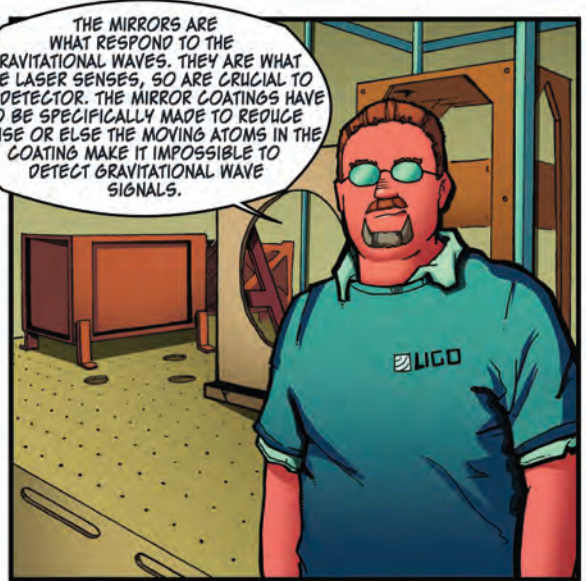
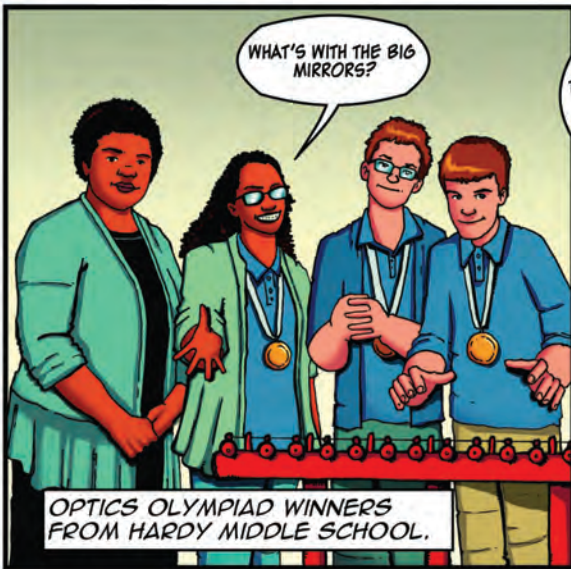
W
BOTHELL

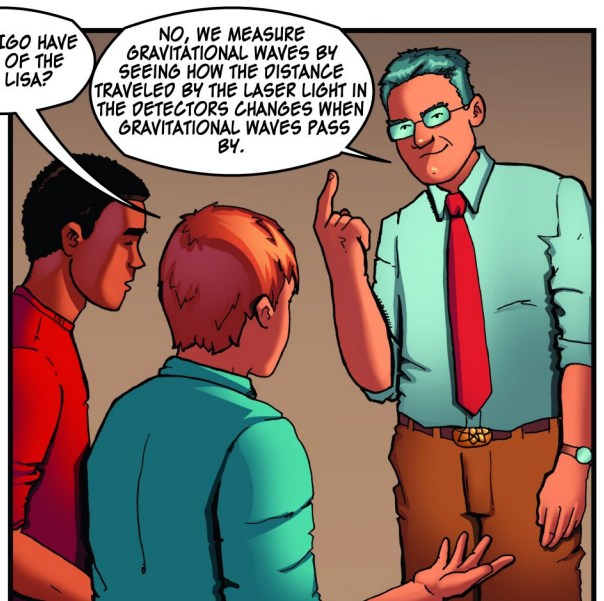
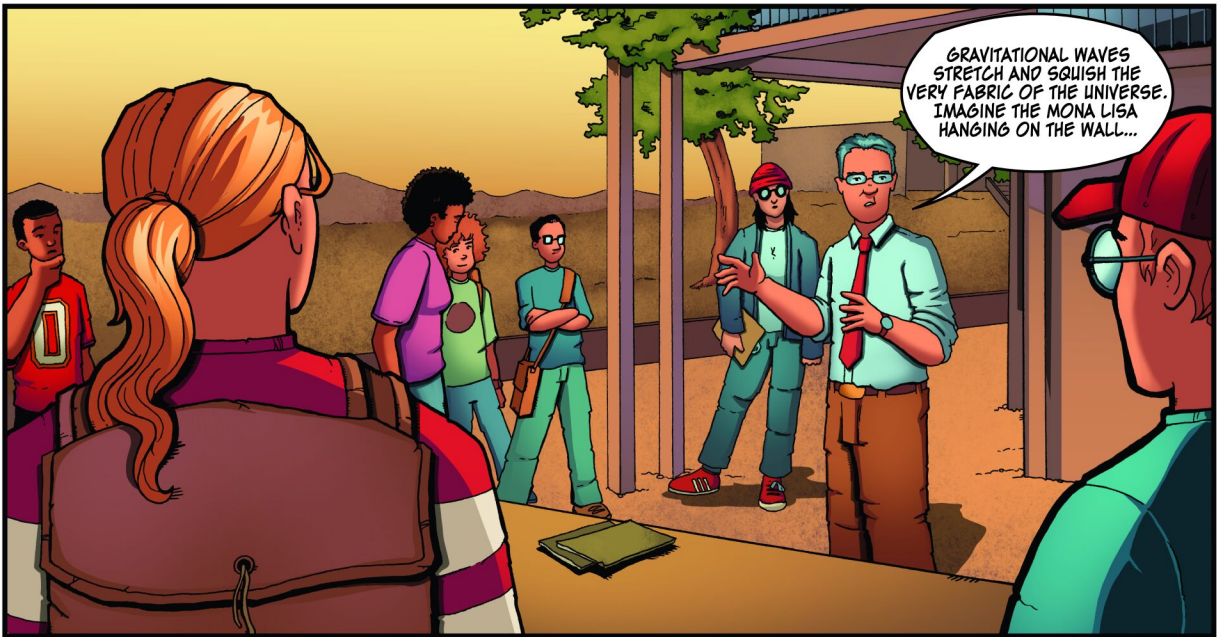


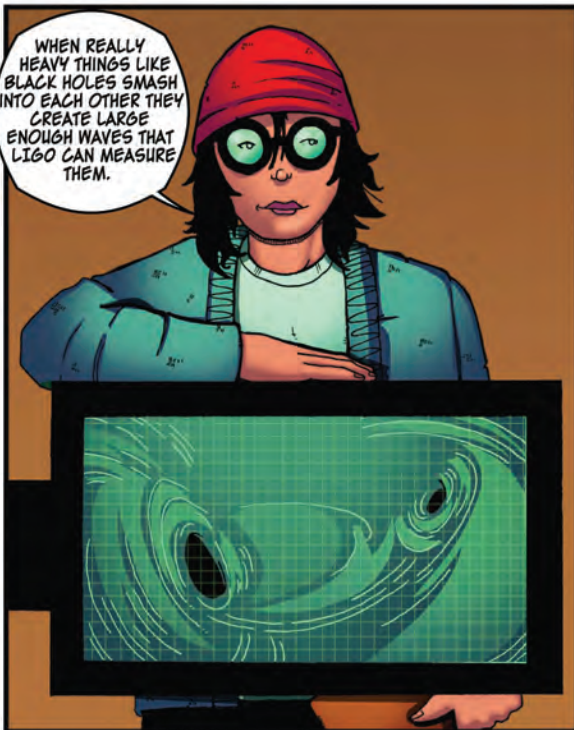
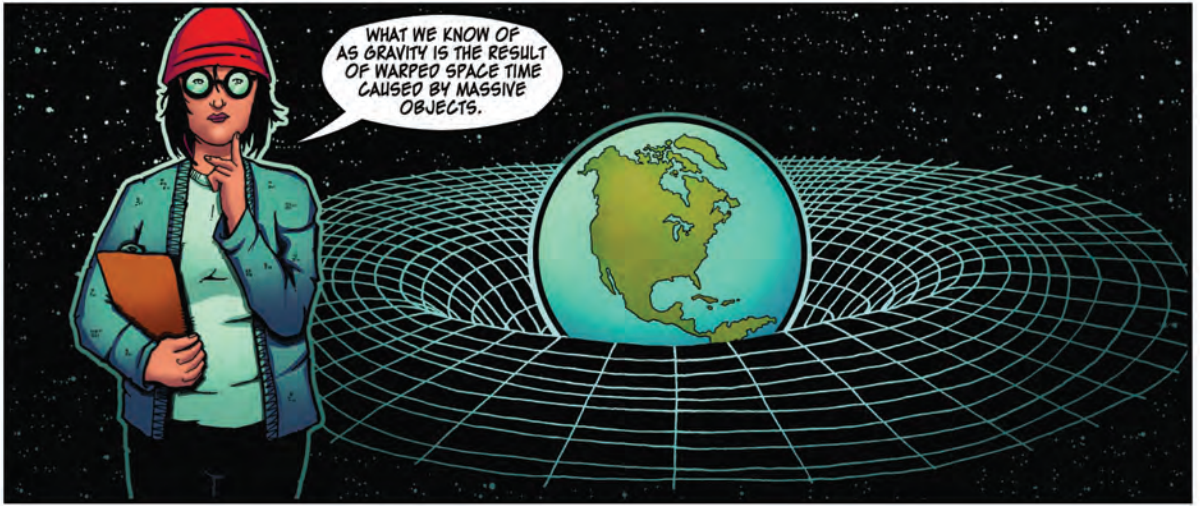
REBECCA THOMPSON, PH.D • SCOTT ARNOLD • ROEL TORRES

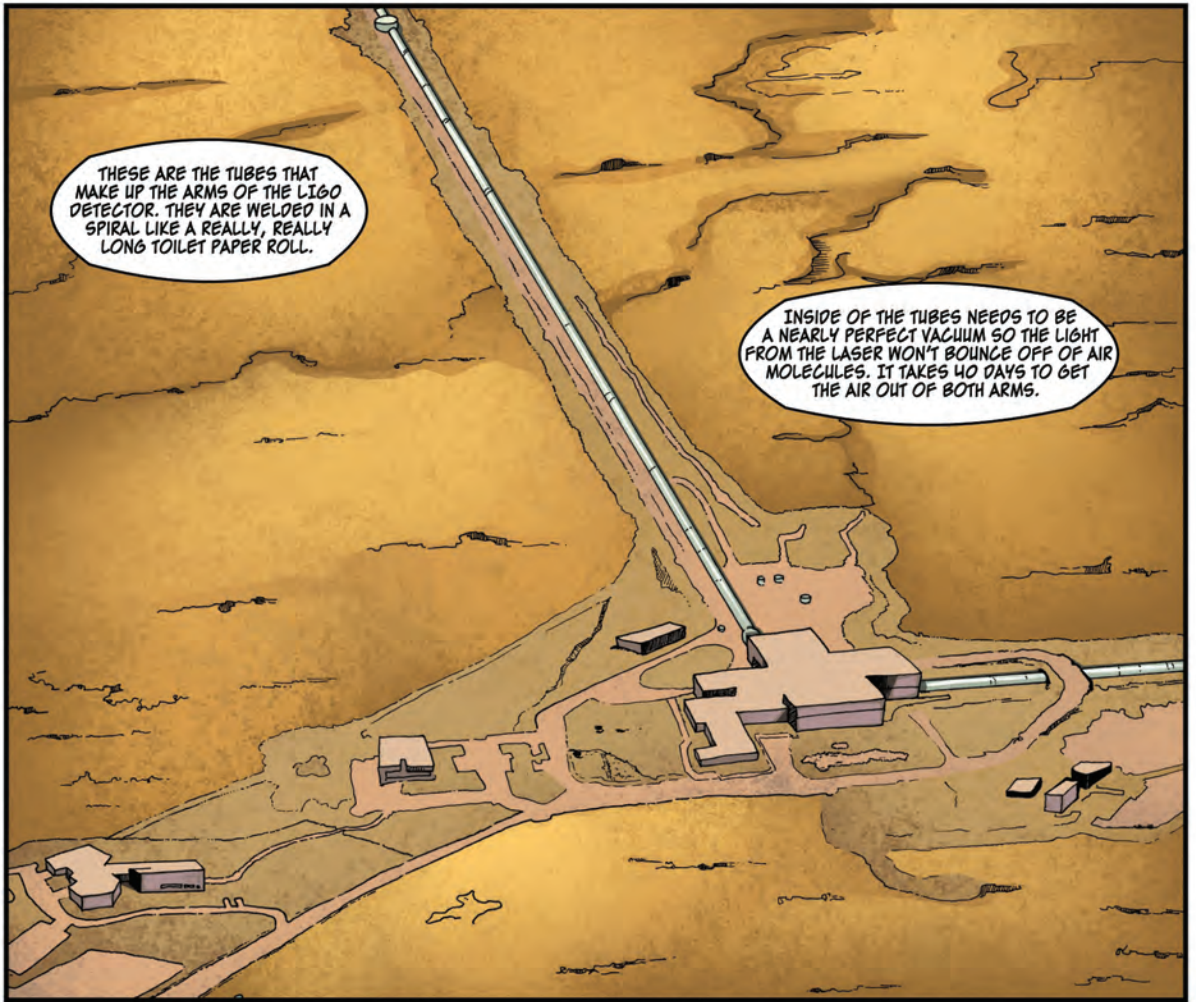












THESE ARE THE TUBES THAT MAKE UP THE ARMS OF THE LIGO DETECTOR. THEY ARE WELDED IN A SPIRAL LIKE A REALLY, REALLY LONG TOILET PAPER ROLL.

INSIDE OF THE TUBES NEEDS TO BE A NEARLY PERFECT VACUUM SO THE LIGHT FROM THE LASER WON'T BOUNCE OFF OF AIR MOLECULES. IT TAKES 40 DAYS TO GET THE AIR OUT OF BOTH ARMS.



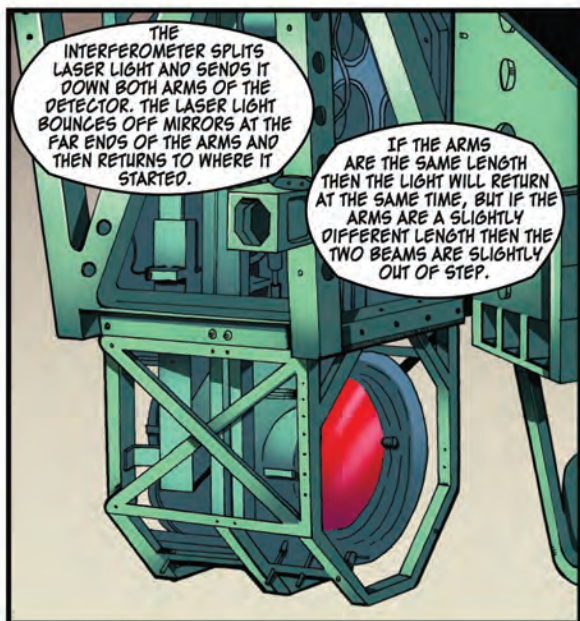
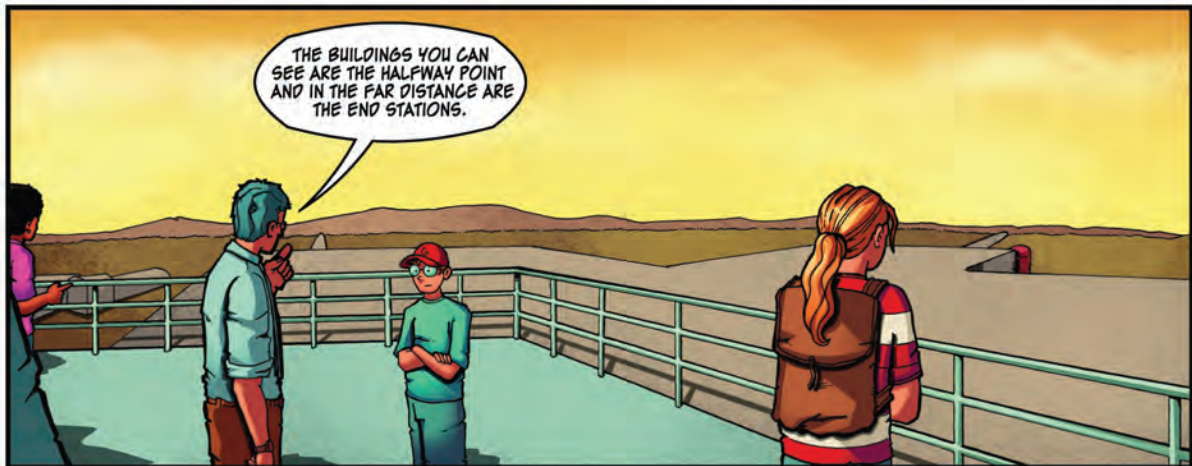
THEY HAVE TO BE PERFECT CYLINDERS OR THEY WILL GET CRUSHED WHEN THE AIR GOES AWAY. THERE CAN'T BE ANY LEAKS. THE TUBES ARE SURROUNDED BY CONCRETE TO PROTECT THEM FROM THE ENVIRONMENT.

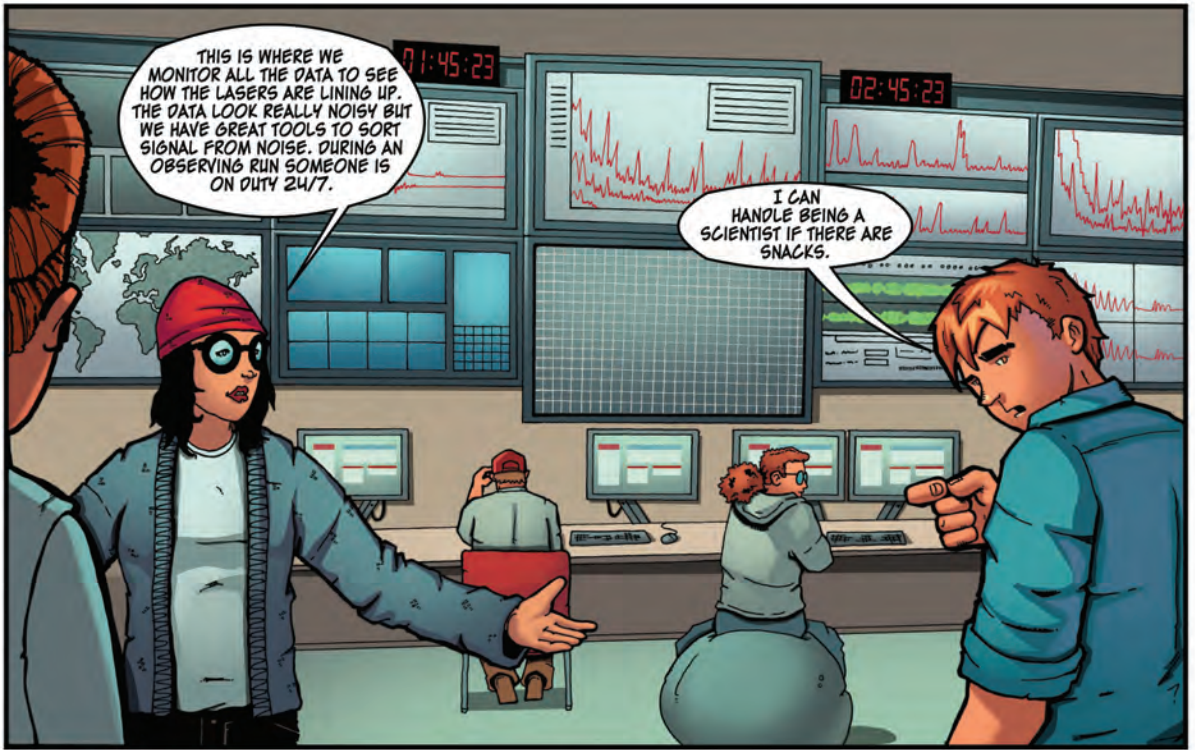


WHAT WOULD HAPPEN IF A MOUSE GOT TRAPPED IN THERE WHILE THE AIR WAS BEING SUCKED OUT?

THE VACUUM WOULD KILL THE MOUSE.

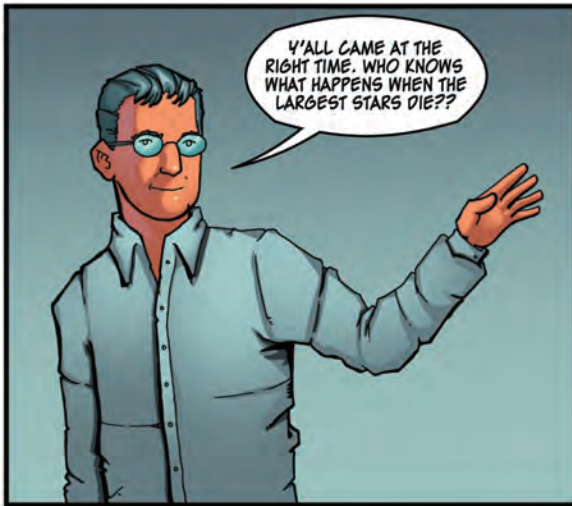
GEEZE...





THIS IS WHERE WE MONITOR ALL THE DATA TO SEE HOW THE LASERS ARE LINING UP. THE DATA LOOK REALLY NOISY BUT WE HAVE GREAT TOOLS TO SORT SIGNAL FROM NOISE. DURING AN OBSERVING RUN SOMEONE IS ON DUTY 24/7.

I CAN HANDLE BEING A SCIENTIST IF THERE ARE SNACKS.



Y'ALL CAME AT THE RIGHT TIME. WHO KNOWS WHAT HAPPENS WHEN THE LARGEST STARS DIE??



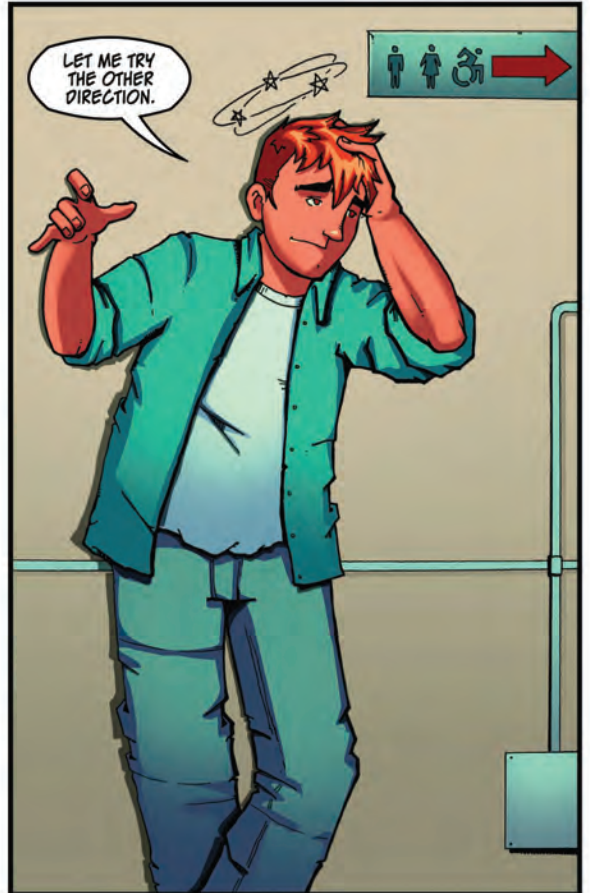
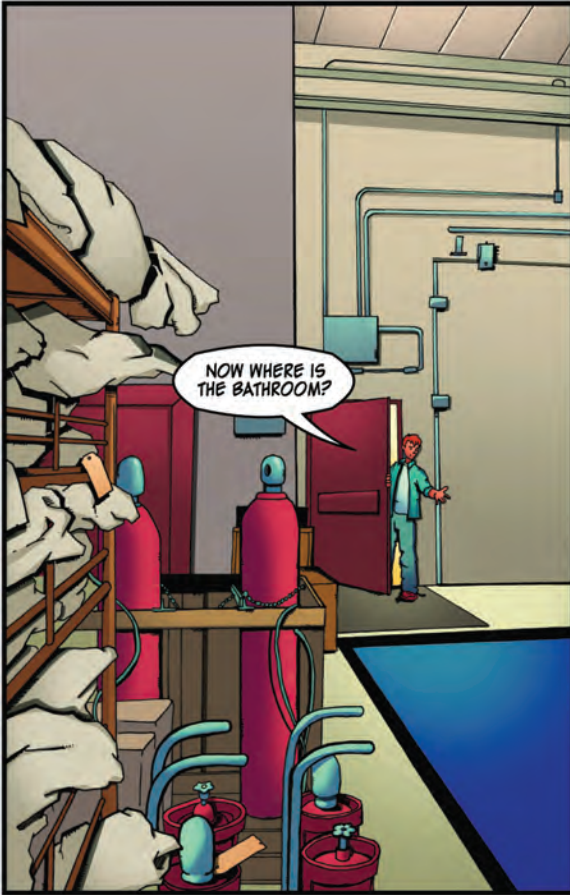
IN A STAR, NUCLEI OF ELEMENTS ARE SLAMMED TOGETHER AND MAKE BIGGER ELEMENTS.



AT SOME POINT, THE STAR CAN'T MAKE ANYTHING ELSE AND IT COLLAPSES AND WHEN IT DOES IT MAKES A HUGE EXPLOSION WE CALL A SUPERNOVA.



AMAZINGLY, WE KNOW THAT A NEARBY STAR IS ABOUT TO GO SUPERNOVA!







WHERE'S KAS? WE NEED TO FIND HIM.

OKAY, EVERYONE OUT!



EVERYONE SEEMS PRETTY WORRIED THAT THE LASER WENT DOWN.

KAS IS MISSING AND THE LASER WON'T WORK? I DON'T THINK IT'S A COINCIDENCE. I BET YOU IT'S HIS FAULT.



THERE YOU ARE! WHERE HAVE YOU BEEN?

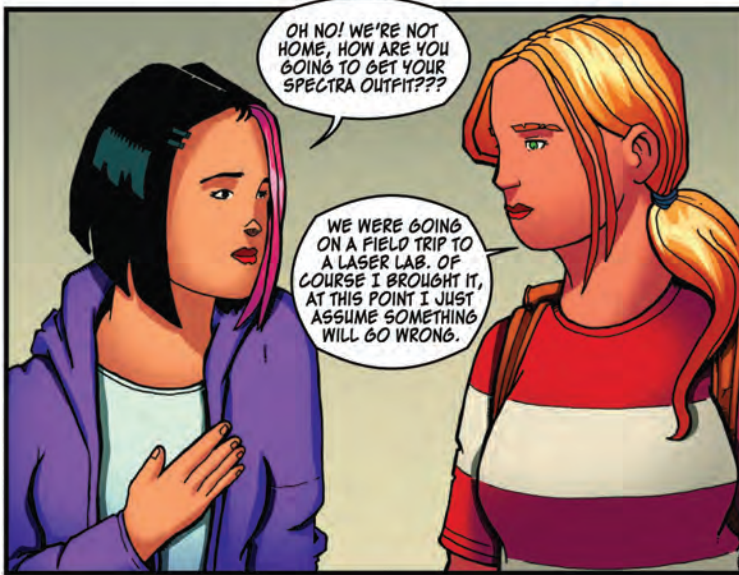
WHAT? I WAS JUST LOOKING FOR A BATHROOM. TOOK ME LONGER THAN I EXPECTED.



SURE. AND I'M GUESSING MAYBE YOU ALSO BROKE A LASER WHILE YOU WERE MISSING?



WAIT, THE LASER IS DOWN? I CAN TOTALLY FIX THAT!



OH NO! WE'RE NOT HOME, HOW ARE YOU GOING TO GET YOUR SPECTRA OUTFIT???

WE WERE GOING ON A FIELD TRIP TO A LASER LAB. OF COURSE I BROUGHT IT, AT THIS POINT I JUST ASSUME SOMETHING WILL GO WRONG.



I WOULD HAVE PAID MORE ATTENTION IF I'D KNOWN I WAS GOING TO HAVE A TEST ON THIS.



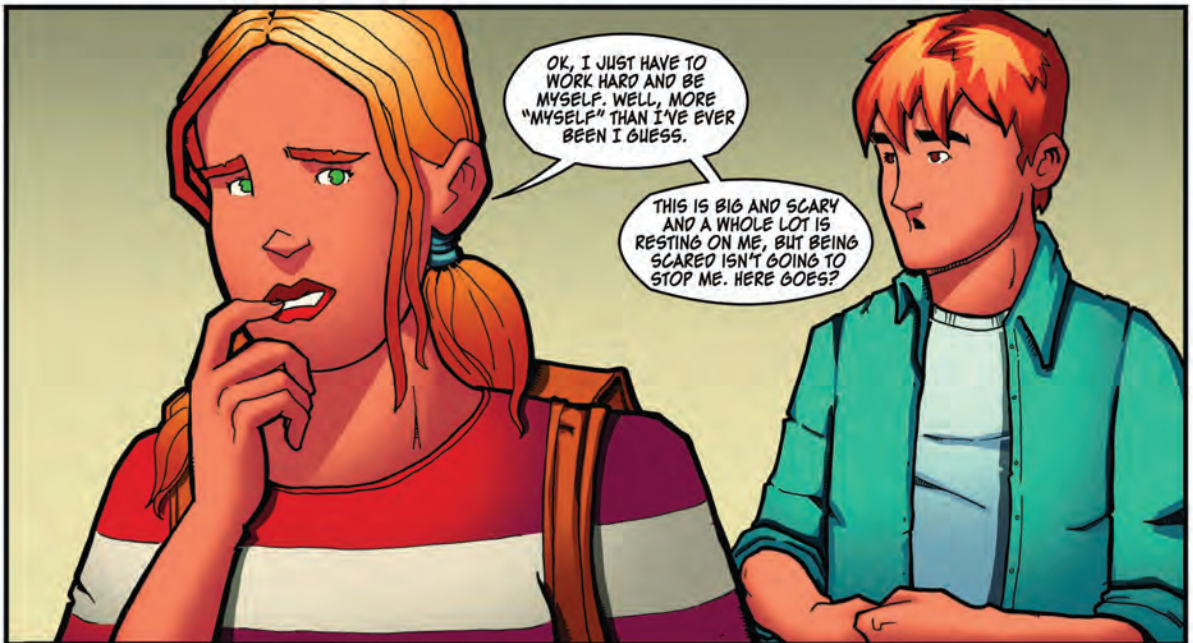
YOU HAVE TO GO INTO THE LIGO INTERFEROMETER, SPLIT IN THE BEAM SPLITTER, BOUNCE BACK AND FORTH DOWN THE ARMS FOR A BIT, AND MEET BACK UP WITH YOURSELF.

YOU HAVE TO BE VERY POWERFUL. LIKE 200 WATTS WHICH IS ABOUT 50,000 TIMES MORE POWERFUL THAN WHEN YOU PLAY WITH YOUR CAT.



YOU NEED TO BE EXACTLY 1064 NANOMETERS, NO MESSING AROUND. YOU'LL BE INVISIBLE AT THAT WAVELENGTH, TOO. YOU'VE NEVER HAD TO BE THIS POWERFUL OR THIS EXACT.

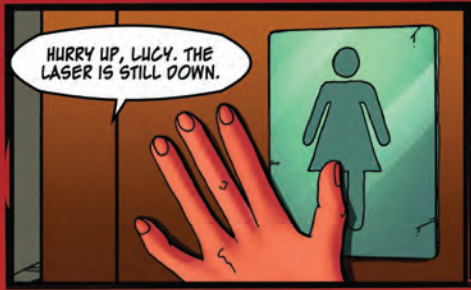
THE SOLUTION MIGHT LOOK EASY, BUT THE POWER AND PRECISION ARE WHAT MAKES IT DARN NEAR IMPOSSIBLE. SO SUIT UP AND GO GET 'EM, CHAMP!



OK, I JUST HAVE TO WORK HARD AND BE MYSELF. WELL, MORE "MYSELF" THAN I'VE EVER BEEN I GUESS.

THIS IS BIG AND SCARY AND A WHOLE LOT IS RESTING ON ME, BUT BEING SCARED ISN'T GOING TO STOP ME. HERE GOES?







HEADING DOWN THESE TUBES IN LASER FORM IS EXCITING!



THE BEAM SPLITTER!

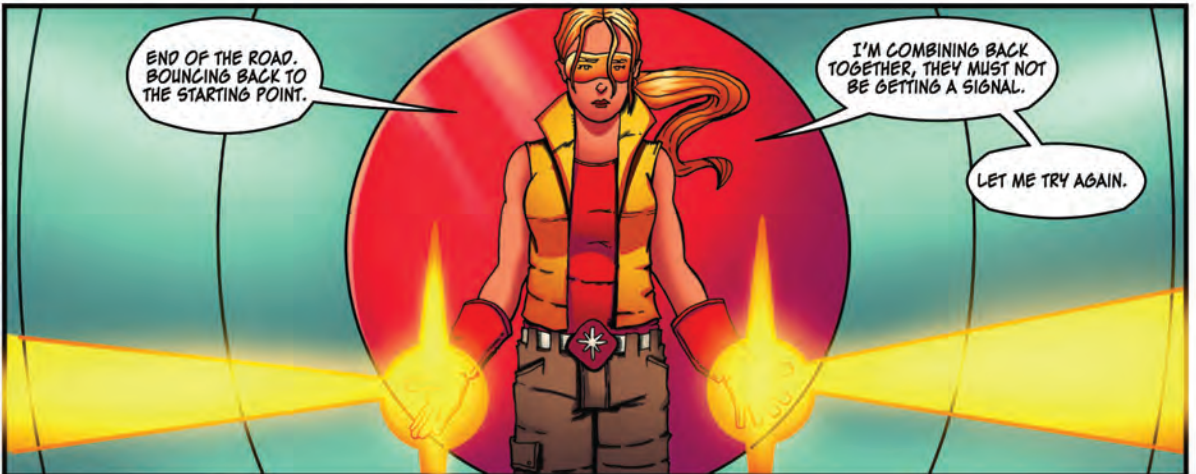
I'M SPLITTING UP!



OH, LOOK, THERE I AM. HELLO, ME!



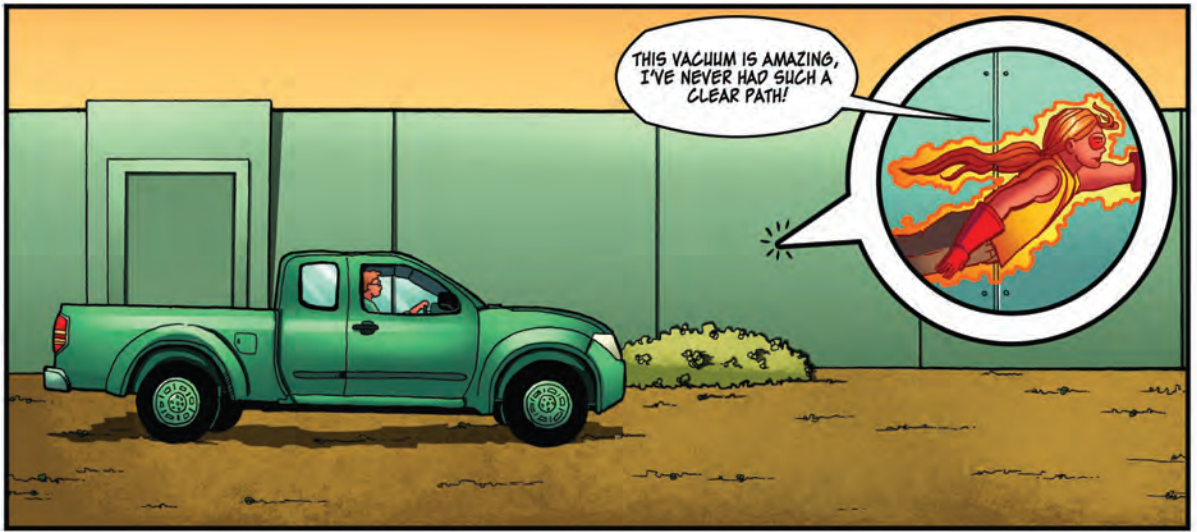
HI, ME!

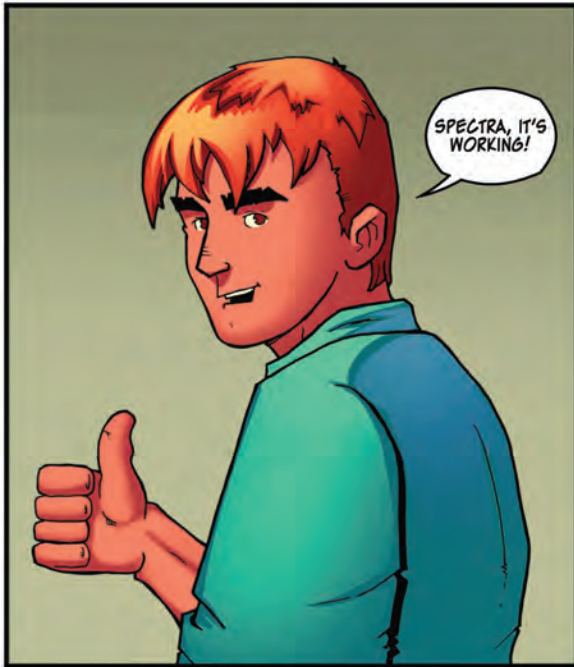


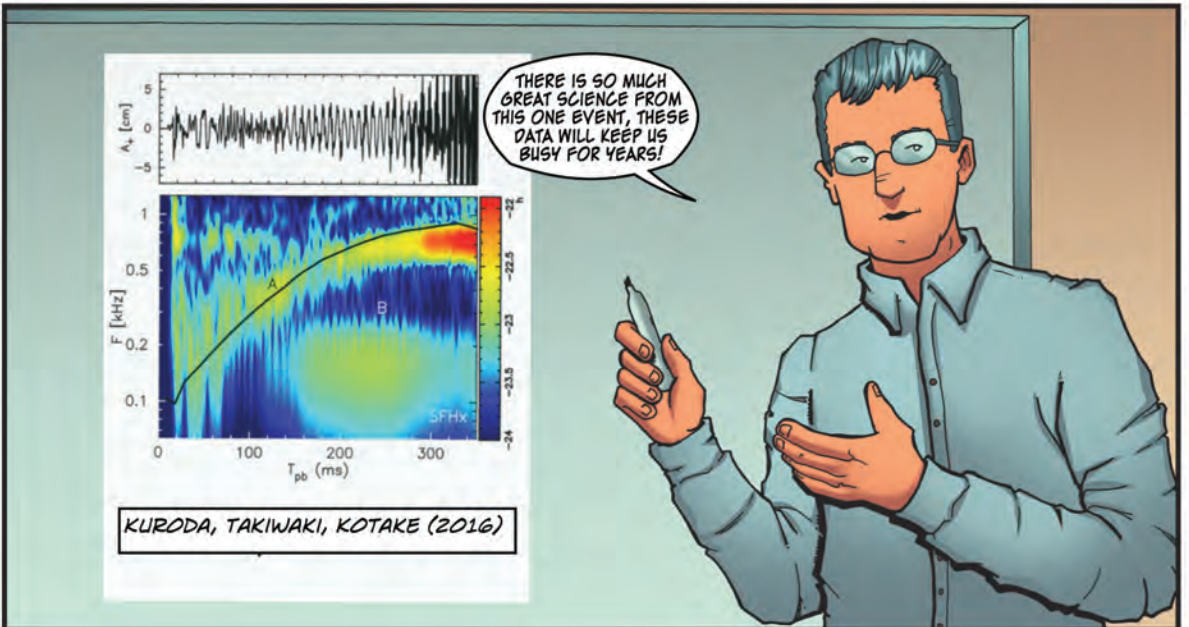
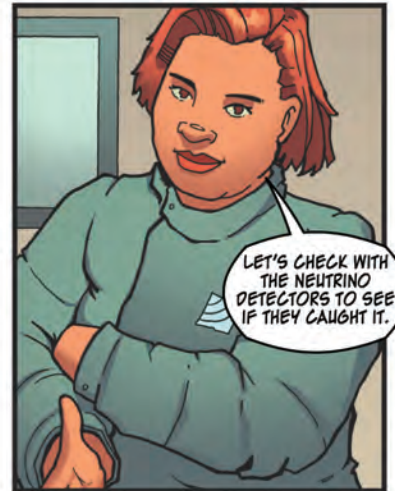
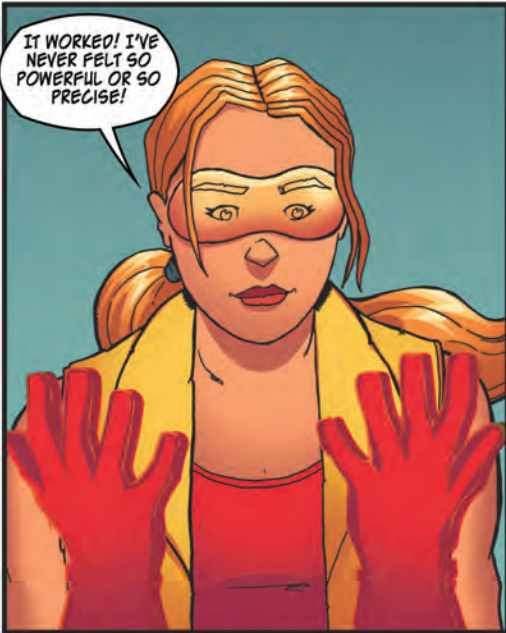
END OF THE ROAD. BOUNCING BACK TO THE STARTING POINT.

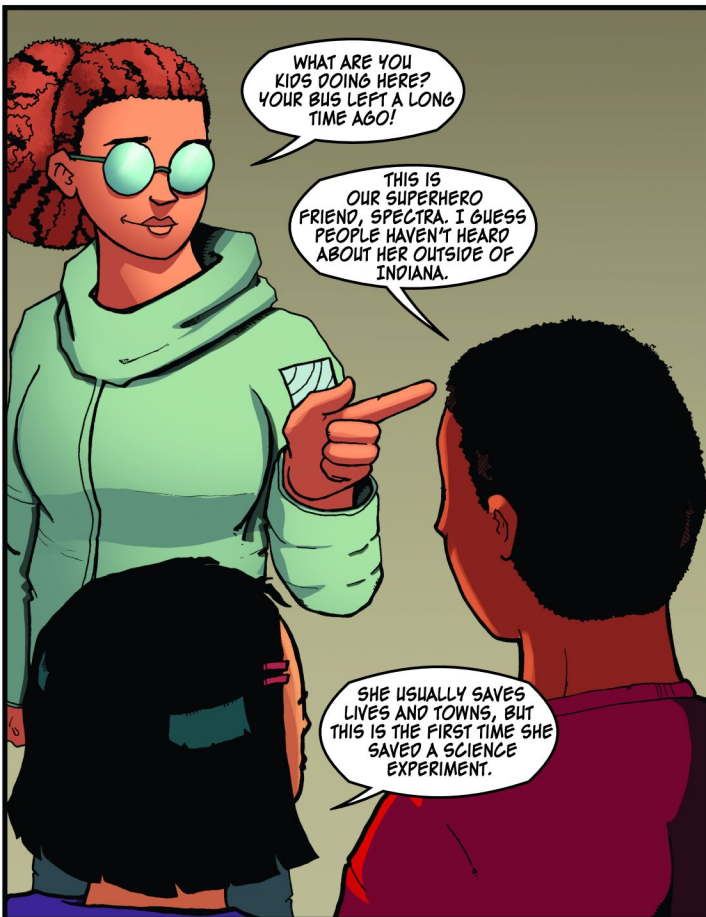
I'M COMBINING BACK TOGETHER, THEY MUST NOT BE GETTING A SIGNAL.

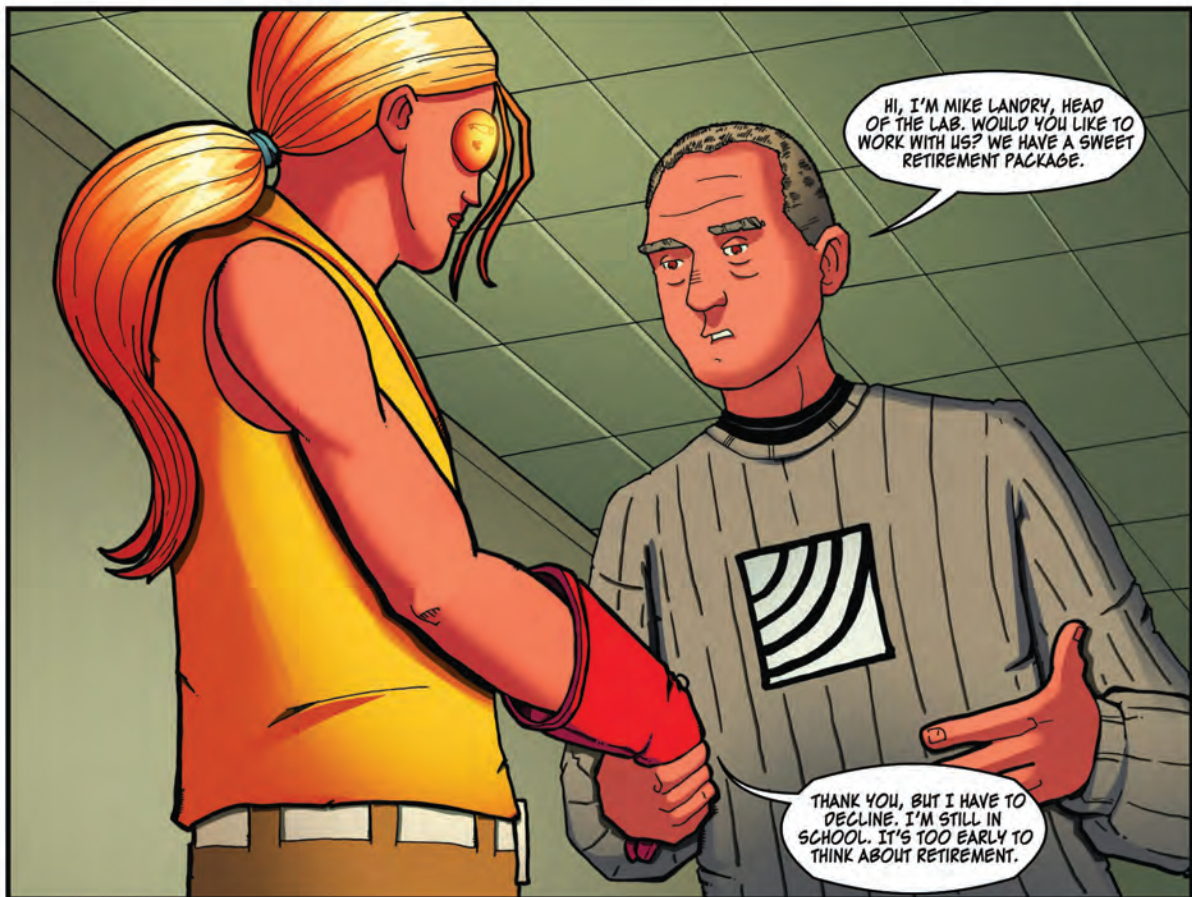
LET ME TRY AGAIN.











HI, I'M MIKE LANDRY, HEAD OF THE LAB. WOULD YOU LIKE TO WORK WITH US? WE HAVE A SWEET RETIREMENT PACKAGE.

THANK YOU, BUT I HAVE TO DECLINE. I'M STILL IN SCHOOL. IT'S TOO EARLY TO THINK ABOUT RETIREMENT.

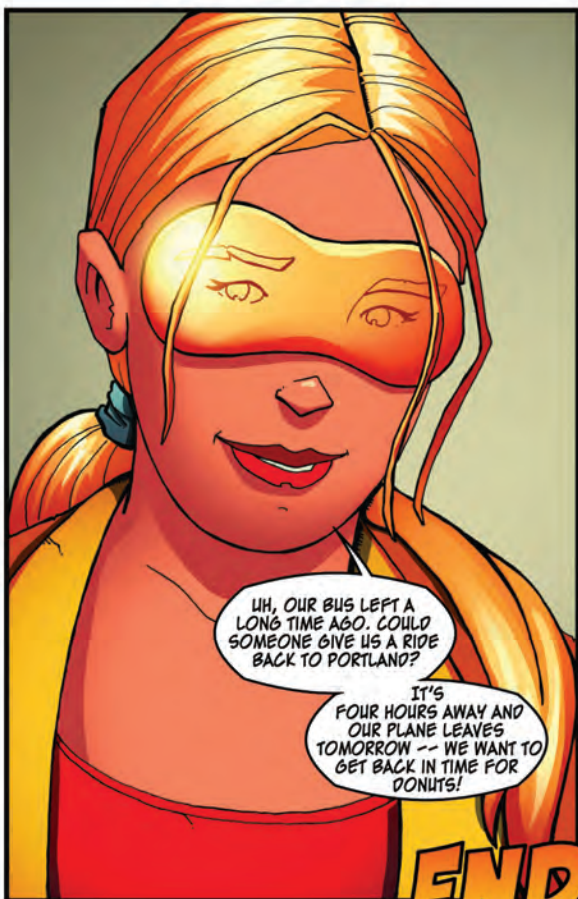


I DON'T WANT TO SPEND MY DAYS IN AN INTERFEROMETER. I WOULD RATHER BUILD BETTER LASERS.

I UNDERSTAND. WELL, WHEN YOU'RE READY, YOU'RE WELCOME BACK HERE ANY TIME.

HERE, TAKE AN OFFICIAL LIGO COFFEE MUG.

I DON'T DRINK COFFEE YET, BUT MY PARENTS WILL LOVE IT! THANK YOU!

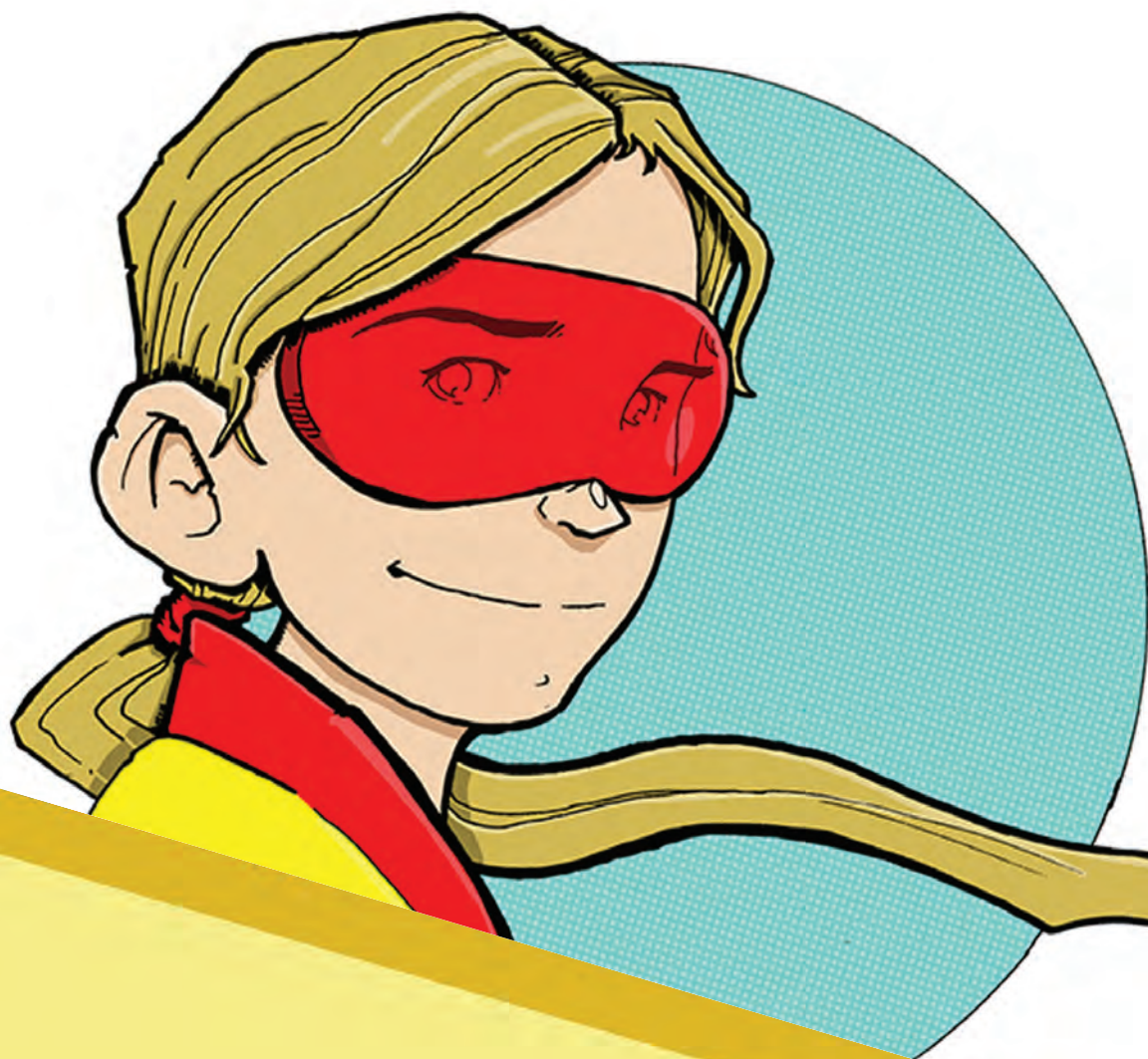


UH, OUR BUS LEFT A LONG TIME AGO. COULD SOMEONE GIVE US A RIDE BACK TO PORTLAND?

IT'S FOUR HOURS AWAY AND OUR PLANE LEAVES TOMORROW -- WE WANT TO GET BACK IN TIME FOR DONUTS!

END





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