

ANGLAIS

Semestre 1



UNIVERSITÉ DE NANTES

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Semestre 1 2

Session 1 2

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PAS DE SORTIE AUTORISEE avant 1H00 d'épreuve

Répondez **UNIQUEMENT SUR LE SUJET** dans les espaces prévus à cet effet

N'inscrivez **RIEN DANS LES ZONES GRISEES** (prévues pour la correction)

Votre étiquette d'anonymat est à appliquer **SUR LA COPIE VIERGE**
Reportez votre **NUMERO D'ANONYMAT** sur chaque feuillet

Numéro d'Anonymat :

Scientists create light-matter like Darth Vader's lightsaber

A beam of light is supposed to shine off into infinity, but when Darth Vader and Luke Skywalker whip out their lightsabers for some spark-flying action, the light blades extrude like stick deodorant and then just stop.

It's like they're stick of light-matter.

5 Hollywood may have made that stuff up, but now, scientists at MIT and Harvard have actually made that stuff -- not enough for a lightsaber, only a subatomic smidgeon. But even that much is a big deal.

Light-matter existed previously only in theory, but now, for the first time, it has been observed in reality, researchers from the Center for Ultracold Atoms say.

10 To oversimplify things, we'll say that photons are subatomic particles that make up light. They have no detectable mass the way most matter does, and usually, they don't stick together. You can shoot two lasers at each other, and the photons will pass right through one another.

But physicists Mikhail Lukin and Vladan Vuletic recently got them to stick together to form 15 molecules.

They published the results of their work in the science journal Nature this week.

The newly created photon molecules don't behave like traditional light, but more like a lightsaber, Lukin said. "The physics of what's happening in these molecules is similar to what we see in the movies."

20 But don't picture yourself swashbuckling with a lightsaber just yet. As in the creation of pretty much all unusual matter, scientists have to produce extreme conditions in laboratories that can't exist naturally anywhere on Earth.

They pumped atoms of rubidium, a kind of metal, into a vacuum chamber -- air would otherwise rapidly alter them. This created a metal cloud that they cooled down with lasers 25 to about -450 degrees Fahrenheit, near what is called absolute zero. That makes atoms almost stand still.

Then they fired photons into the atom cloud.

The photons, elements of light, did not shoot through at the speed of light but acted a little like regular matter instead. They bumped into the atoms in a way similar to the way regular 30 matter would.

In the process, the photons slowed down enough to bump into each other and bond into molecules.

It was a first.

Though that's fascinating, it doesn't make for a handy lightsaber.

35 But it could help in the future development of super computers known as quantum computers, Lukin said. And with some work, scientists could make whole crystals out of light.

So, if Darth Vader shows up with a lightsaber, your great-grandchildren may be able to throw photon rocks at him.

40 But don't count on it.

by **Ben Brumfield**, CNN, September 27, 2013

PART ONE : VOCABULARY (10 points)

<i>In the text, find equivalents for the following words (the word structure may be slightly different)</i>		SCORE
ray		
very small quantity		
a lot		
to stay together		
to act		
sort		
not to move		
to hit		
practical		
entire		
TOTAL (/ 10 POINTS)		

PART TWO: COMPREHENSION (10 points)

Say whether the following statements are TRUE OR FALSE, and justify by quoting from the text. Indicate the <u>PRECISE</u> reference <u>AND</u> copy the relevant passage ; add comments in your own words if necessary.			SCORE
1. MIT and Harvard used research from Hollywood.			
T	F		
2. MIT and Harvard can create a big object made out of light.			
T	F		
3. Photons normally cannot collide.			
T	F		
4. You need a special atmosphere to create light-matter.			
T	F		
5. Air may alter rubidium atoms			
T	F		
6. With a temperature around the absolute 0, atoms slow considerably.			
T	F		
7. In light-matter experiments, the photons were not affected by the atoms.			
T	F		
8. Photons normally do not form molecules.			
T	F		
9. Quantum computers will benefit from the discovery.			
T	F		
10. Your great-grandchildren may have lightsabers.			
T	F		
TOTAL (/ 10 POINTS)			

PART THREE: CULTURAL LANDMARKS (10 points)

<i>Answer the following questions about the civilisation documents you have studied</i>	SCORE
Why was geometry called Euclidian geometry in the 19th century?	
What did Steve Job's return to Apple bring the company?	
Why did Fleming search for anti-bacterial agents?	
What did Newton do concerning optics?	
What is "The Map that Changed the World" by William Smith?	
TOTAL (/ 10 POINTS)	

PART FIVE: GRAMMAR (10 points)

Choose the correct answer					SCORE	
1. I refuse _____ there's only one option.				A	B	
A. to believe	B. believing	C. he believes	D. believe	C	D	
2. He's sleeping much _____ now that he's turned off the TV.				A	B	
A. good	B. well	C. better	D. best	C	D	
3. He _____ when they came for dinner.				A	B	
A. already finishes	B. already finished	C. has already finished	D. had already finished	C	D	
4. He is _____ only candidate we have.				A	B	
A. a	B. the	C. an	D. such an	C	D	
5. If I hadn't reached for my mobile phone, I _____ that accident.				A	B	
A. wouldn't have had	B. wouldn't have	C. wouldn't had	D. wouldn't had had	C	D	
6. Let's finish early and have lunch, _____ ?				A	B	
A. will we	B. let we	C. shall we	D. don't we	C	D	
7. Anakin _____ by Palpatine to a great extent.				A	B	
A. has been influencing	B. influenced	C. was influencing	D. was influenced	C	D	
8. He _____ a student at Nantes University for 2 years now.				A	B	
A. is	B. has been	C. was	D. had been	C	D	
9. Living in a submarine, he _____ to open the window ...				A	B	
A. couldn't have tried	B. shouldn't have tried	C. couldn't tried	D. shouldn't tries	C	D	
10. _____ is completely useless to me.				A	B	
A. The paper of last month	B. Last month's paper	C. The paper of last month's	D. The last month's paper	C	D	
TOTAL (/10 POINTS)						

