

## TODAY'S WEATHER

PARTLY CLOUDY  
20 °C

4 Day Forecast | Traffic

**Tide** **TOTALCARE™** 95% cotton, 5% lycra 30 washes

Helps keep clothes looking like new.

Enter for a chance to WIN\* a prize pack valued at **\$5000!** [Enter now!](#)

\*contest closes June 30, 2009

Next Leading Liquid Detergent

Friday, May 08, 2009 | Today's Toronto Star | [Login](#)[PHOTO](#) [VIDEO](#) [COLUMNISTS](#) [BLOGS](#) [TWITTER](#) [RSS](#) [MOBILE](#) [NEWSLETTERS](#) [ALERTS](#)



thestar.com
  Web
  find a Business

[Advanced Search](#) | [Full Text Article Archive](#)

[AUTOS](#)  
[CAREERS](#)  
[CLASSIFIEDS](#)  
[DEATH NOTICES](#)  
[REAL ESTATE](#)
[HOME](#) [NEWS](#) [OPINION](#) [BUSINESS](#) [SPORTS](#) [ENTERTAINMENT](#) [LIVING](#) [TRAVEL](#) [WHEELS](#) [HEALTHZONE](#) [YOURHOME](#) [PARENTCENTRAL](#)
[Editorials](#) | [Columns](#) | [Readers' Letters](#) | [Polls](#) | [Corrections](#) | [Blogs](#)

## What we know for certain about uncertainty

May 08, 2009 04:30 AM

Be the first to comment on this article...

**DR. ROBERT BUCKMAN**  
 SPECIAL TO THE STAR

Physics research by Jeff Lundeen and Aephraim Steinberg at the University of Toronto shows that subatomic particles continue behaving normally even when nobody's looking at them.

In other words, electrons carry on doing their electron-type jobs (such as whirling) day and night whether anybody is actually observing them or not.

I had simply assumed that the laws of physics were always and perpetually obeyed: I mean 24/7, including bank holidays and even during a recession when everything seems to be slowing down.

I figured it was business as usual on the subatomic scale and on the cosmic scale, and always felt confident, for example, that while I'm asleep, the universe will continue spinning and expanding as it does during the day. And that it will still be there when I wake up.

Apparently that assumption was somewhat blithe. There were some quite serious doubts about it (at least on the subatomic scale) and about the nature of reality. And where did all this doubt come from? Who started it?

Personally, I blame Werner Heisenberg.

Heisenberg – he of the Heisenberg Uncertainty Principle – was an utterly brilliant nuclear physicist (a friend of Einstein and Born and that gang) who said that it was never possible to determine an electron's position and its velocity at the same time. I'm still not sure why anybody would have wanted to do that in the first place, but Heisenberg's Uncertainty Principle said you couldn't do it anyway, and that was that.

Anyway, the whole business apparently gets more complex when we think of pairs of particles which can cancel each other out. I gather a lot depends on the behaviour of pairs of things, such as particles of matter paired with particles of anti-matter. Now I don't actually know what anti-matter is, but I think it's stuff you can get in a cream that will abolish cellulite.

It was always assumed (by almost everyone, not just me) that particles of matter and particles of anti-matter would perfectly cancel each other out, releasing a burst of energy.

But there was this nagging doubt that they might do something different, say, on Sundays, during the summer, or in alternate universes and places such as Idaho.

Lundeen and Steinberg did some experiments (now confirmed by Kazuhiro Yokota of Osaka University in Japan) with photons – which are the smallest particles of light – and anti-photons – of which I do not have the foggiest conception.

Perhaps anti-photons are the smallest particles of darkness, and if you put a lot of them together you get a black hole or some other matter-destroying device. For example, Bernie Madoff. Anyway, photons apparently go around in pairs due to a process called Quantum Entanglement, which I think is like a dating service for very small (and presumably lonely) particles.

It turns out the experiments in Toronto and Osaka clearly show that even when you're not looking directly at them, photons and anti-photons still stick to the proper rules and are upright, laws-of-physics-abiding citizens all the time.

So the universe does do things properly and in an orderly and trustworthy way after all.

And the cosmos is basically Canadian in its outlook and respect for the rules. What a relief!

*Dr. Robert Buckman is a medical oncologist at Princess Margaret Hospital and professor at the University of Toronto.*



### MORE IN THE NEWS

[City doctors operate on fetus inside womb](#)
[Ruby Dhalla's lawyer alleges 'vicious' conspiracy](#)
['Pirate' Niagara wine beats world's best](#)
[Space city an idealized Toronto](#)
[Tori investigation extends to Calgary](#)

### RECENT SPECIAL SECTIONS

[Sick Kids](#)  
[Allergies & Asthma](#)  
[Home Improvement](#)  
[Home Office Guide](#)  
[Wheels Extra](#)  
[Canada's Best Diversity Employers 2009](#)  
[Investing](#)  
[Guide to Colleges & Universities](#)  
[New Workers, New Skills](#)  
[2008 Atkinson series](#)

[More Specials](#)

Comments on this story are moderated | [Login to Comment](#) | [Commenting Guidelines](#)

Sort By

Ads by Google

**Your Hospital Performance**

How does your hospital perform?  
Better or lower than average?  
[www.myhospitalcare.ca](http://www.myhospitalcare.ca)

**MOST POPULAR ON THESTAR.COM**

Most Read

- Dhalla worker paid under table
- 'Pirate' Niagara wine beats world's best
- Tori investigation extends to Calgary
- Horoscopes for Friday, May 8
- Money is in Balsillie's pocket, but NHL isn't

**SPECIAL**



**NHL in southern Ontario**

No matter what happens with the Phoenix Coyotes the issue of a second NHL team in southern Ontario is not going away.



**Electric motorbike to hit the streets**

A battery-powered motorbike that will do 96 km/h is headed for Canadian roads.



**Personal bailout page**

The Star's Personal Bailout page offers daily advice and information on how readers can weather the current economic crisis.

[More Special](#)

Ads by Google

**Swine Flu Song**

Keeping Fake Pandemics  
Provocative, Productive, and Fun  
[www.myspace.com/RebeccaFmusic](http://www.myspace.com/RebeccaFmusic)

**ISO 16232 Particle Sizing**

Fully Automated Filter Scanning  
Saves Time - Accurate - Easy to Use  
[www.gt-vision.com](http://www.gt-vision.com)

**Quantum Physics Secrets?**

Hidden Knowledge of the Universe!  
Answers to Life's Greatest Mysteries  
[MindReality.com/Quantum-Physics](http://MindReality.com/Quantum-Physics)

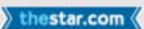
**TheStar.com** | [Corrections](#) | [Contact Webmaster](#) | [FAQ](#) | [Site Map](#) | [RSS](#) | [The Star on Twitter](#)

**Toronto Star** | [About Us](#) | [Subscribe](#) | [Subscriber Self Services](#) | [Contact Us](#) | [News Releases](#) | [Star Internships](#) | [Careers at the Star](#)

**Advertise With Us** | [Media Kit](#) | [Online Advertising](#) | [Print Advertising](#) | [Special Sections](#)

**Initiatives** | [Santa Claus Fund](#) | [Fresh Air Fund](#) | [Classroom Connection](#) | [Community Giving](#)

**Torstar Sites** | [toronto.com](#) | [InsuranceHotline.com](#) | [Pages of the Past](#) | [Stock Photos](#) | [New In Homes](#) | [ShopTV](#) | [More...](#)



© Copyright Toronto Star 1996-2009 | [Terms & Conditions](#) | [Privacy Code](#)

