New Particle Exhibits Quantum Behaviour

New research has established that collections of toilet rolls (called packs) exhibit quantum behaviour. These "packs" see groups of discrete toilet rolls bound together in highly structured and repeatable configurations. The binding – usually a polymer film – holds the rolls together in a semi rigid formation. Energy is required to break the binding allowing individual rolls to be freed from a pack. Once a roll is freed, it is difficult, but not impossible to rebuild it into a pack. The number of rolls in a pack ranges from two (2-packs) up to 48 (48-packs). There is evidence for the existence of larger packs, and also evidence that packs of packs or meta-packs exist.

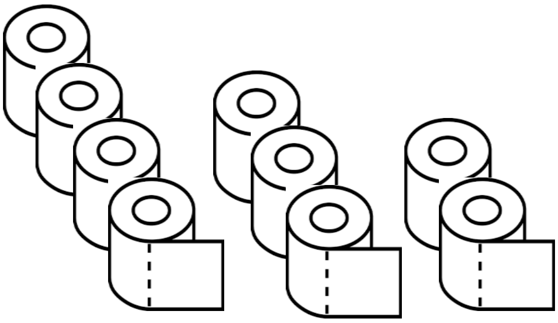

Figure 1: 4-Pack, 3-Pack and a 2-Pack

Within a pack, rolls can be arranged in various configurations, including linear (vertically orientated rolls in a single line), stacked (two or more linear configurations stacked in the same plane), multi-dimensional (two or more stacked groups adjacent to one another). There are multiple configurations for certain pack sizes. For example, a 4-pack can be arranged linearly, or two by two in a plane or stacked vertically, as well as in other patterns. These configurations are illustrated below. A classification system for the grouping of collections of toilet rolls has been developed.

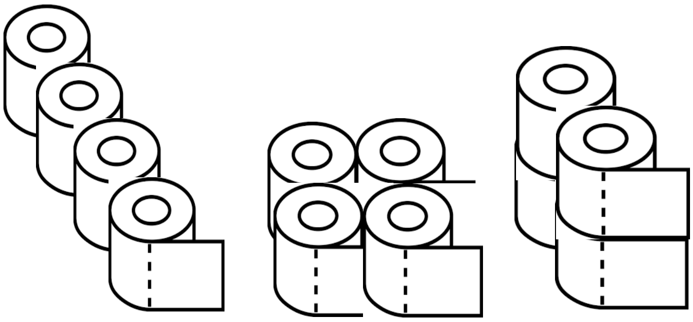

Figure 2: Three configurations of 4-Packs. Linear, planar and vertical.

Until now, quantum behaviour has only been observed in subatomic particles. Certain particles only exist in discrete quantum states or levels. Unlike normal particles which can transition from one state or level to another smoothly and gradually, quantum particles jump from one state to another. They are never observed in between states, or in transition from one state to another.

Now, it has been found that the common toilet roll, when grouped into packs exhibits quantum behaviour. It exists only in two discrete states termed TP0 and TP1. As a lay person, you can observe the two discrete toilet paper states just by visiting any supermarket or convenience store. You will see that toilet paper will either exist in abundance, or not at all. These states – TP0 (toilet paper zero) and TP1 (toilet paper one) – are the only states which have been observed for toilet rolls in structured packs. TP0 sees empty shelves and evidence of toilet paper having been present at some time in the past, while TP1 sees the same shelves full or nearly full. No intermediate state has been observed. Multiple experiments observing many different supermarket shelves has only produced observations of TP0 and TP1. These observations have been conducted at a wide range of supermarkets (including independent stores, large chains, at urban and rural locations) at random

Figure 3: TP0 and TP1

times both day and night.

Studies have observed very different behaviour of toilet rolls individually and packs. Breaking the packaging bonds and freeing the individual toilet rolls from a pack seems to remove all quantum behaviour. Free rolls seem to be governed completely by classical mechanics. This has been observed widely in homes and offices, where individual toilet rolls exist in all states ranging from TR1 (toilet roll one), through to TR0 (toilet roll zero). It is interesting to note that TR0 is easily measurable as a cardboard cylinder with either no, or small unusable traces of toilet paper present. Examples of intermediate states include TR0.825, TR0.5, TR0.25 and more. Although the intermediate states have not yet been fully categorised, it is postulated that they will be continuous or near continuous. Despite the existence of obvious perforations in most toilet rolls, toilet paper seems to be infinitely divisible, with these perforations easily breakable. Scientists are beginning to focus on the microstructure of toilet paper, but as yet nothing has been published.

The quantum behaviour of packs of toilet paper, has led to scientists formulating a new model for toilet paper physics. Underlying this model is the observed difference in behaviour for individual toilet rolls (which is governed by classical mechanics) compared to the behaviour of packs or groups of toilet rolls in bound packages (which is governed by quantum mechanics). Because packs behave as a single quantum unit, ongoing studies are now focusing on whether the quantum behaviour differs depending on the size or configuration of the packs. So far, experiments with configurations ranging from 2-packs to 48-packs have been performed. Preliminary results show the same quantum behaviour exists for all configurations, however there is a theory, backed by observation, which states that the quantum transition rate for single configuration packs in isolation is faster for smaller packs. For example, a shelf with only 2-packs present will transition from TP1 to TP0 faster than a shelf with only 4, 8 or 16-packs. However, when collections of various packs exist simultaneously, this behaviour reverses and the transition for the larger packs occurs at a much faster rate. So, a shelf with multiple packs ranging from for example 2-packs to 48-packs will see the 48-packs transition first, then the next smallest and so on until only the 2-packs are left. This behaviour, which sees packs with few constituents behaving completely differently in isolation compared to when they are grouped with packs with larger numbers of constituents has not yet been fully explained. There are several theories circulating amongst the scientific community, with varying results. Whilst these results are preliminary and ongoing, the most promising avenue of research is focusing on a theory that quantum interactions between packs of different size actually influences the behaviour of individual packs. This is consistent with the wave-particle behaviour or matter and the universal field theory, which has up to now only been observed at the subatomic scale.

This work is so far only preliminary. Whilst it has garnered much public interest and has been submitted for publication, we still have a lot to learn about the quantum theory of toilet rolls.

Roger Cohen,

March 31, 2020