The Beauty of Physics

Symmetries and Laws of Conservation

(Noethers Theorem 1908)

By Unknown - Emmy Noether (1882-1935), Public Domain, https://commons.wikimedia.org/w/index.php?curid=66702

The conservation laws for energy, momentum, angular momentum (and other properties) are related to very simple symmetries of physical processes in nature.

A physical process will lead to the same result regardless of where it is in space or time: here on Earth or in galaxy far away; here today or in the future.

Symmetry	**Conserved quantity**	
Translation in space	Linear Momentum	P (kg m/s)
Translation in time	Energy	E (Joules)
Rotation in space	Angular momentum	L (kg m^2/ s
Reflection in space	Parity	+ or -

Origin lies in concept of "action principle".

Reading:

https://en.wikipedia.org/wiki/Conservation_law

http://www.feynmanlectures.caltech.edu/III_17.html

http://www.eng.fsu.edu/~dommelen/quantum/style_a/physsym.html

I chatter, chatter, as I flow
To join the brimming river,
For men may come and men may go,
But I go on for ever. The Brook, Alfred Lord Tennyson