New Physics at the End of the 20th Century

- **4. Accelerating Expansion of the Universe?**
- Results from the ambitious Supernova Cosmology Project and the High-Z Supernovae Project started to produce compelling evidence for an accelerating expansion of the Universe.

New Physics at the End of the 20th Century

- **5. Bose-Einstein Condensation Continues**
- 10.54 am 5th June 1995 physicists at Boulder Colorado create a new state of matter
- Could never have existed in Nature anywhere in the Universe before that time.
- The Bose-Einstein Condensate.
- Predicted in 1924 but its experimental verification was only possible in the closing decade of the last century.
- Subject continues to mature throughout 1999 but could there be other states of matter that have eluded physicists?

New Physics at the End of the 20th Century

- **6. Randall-Sundrum Extra Dimensions**
- Closing two decades of last century dominated by attempts to find a quantum theory that unites gravity with the other three fundamental forces.
- Central to attempts - Superstring theory with extra dimensions beyond the usual four non-compact spacetime dimensions.
- Generally believed that the extra dimensions are folded up after the manner of Kaluza-Klein.
- There are only four non-compact dimensions?
- 1999 saw a dramatic challenge to this folklore by Randall and Sundrum.

- Randall and Sundrum show that it is possible to live in a $4 + n$ non-compact dimensions in perfect compatibility with experimental gravity.
- Our four-dimensional universe is viewed as a membrane (a three-brane) embedded inside a higher dimensional universe.
- Could be subject to experiment.