



## Why

Suppose a measure is not interchangeable with another. Then what. We can separate out the troublesome piece; perhaps it can be handled separately.

## Result

**Proposition 1.** *Let  $(X, \mathcal{A})$  be a measurable space. Let  $\mu$  be a measure on  $(X, \mathcal{A})$ . Let  $\nu$  be a finite signed measure or complex measure or  $\sigma$ -finite measure on  $(X, \mathcal{A})$ . Then there is a unique decomposition  $\nu = \nu_a + \nu_s$  where  $\nu_a \ll \mu$  and  $\nu_s \perp \mu$ .*

The above is also called *Lebesgue's Decomposition Theorem*

