History The technique of muon spin relaxation, rotation or resonance, known collectively as µSR, was first suggested in an historic 1957 paper in Physical Review by Garwin, Lederman and Weinrich, in which parity non-conservation in the weak decay of the muon was demonstrated. These authors wrote that "it seems possible that polarized positive and negative muons will become a powerful tool for exploring magnetic fields in nuclei ..., atoms and interatomic regions." Pioneering efforts at the old cyclotron facilities (LBL, SREL and NEVIS) spawned developments in the technique and its scientific reach. Attempts to realize the original vision of Garwin et al. on a practical scale - where high data rates with relatively clean backgrounds would be available - would have to await construction of the high-intensity meson factories at LAMPF (Los Alamos, USA, 1972), SIN (now PSI, Villigen, Switzerland, 1974) and TRIUMF (Vancouver, Canada, 1974), which could deliver high luminosity muon beams. A major breakthrough occurred in 1985 when Bowen *et al*. built the first 100% polarized surface muon beam (originally called an Arizona beam) at LBL. Even though these earliest µSR efforts could no longer compete with the meson factories, they spawned research teams at TRIUMF and PSI, as well as user groups with the USA. Thus, µSR was invented and its earliest development took place largely in the United States.

The vision of Garwin et al. has now been realized in spectacular fashion in Canada, Switzerland, the UK (ISIS/RAL) and Japan (first at KEK and now at JPARC). The same has not occurred in µSR's country of origin, however. To appreciate why, it is necessary to describe some salient points of the technique. Briefly, an incoming polarized muon beam is stopped in the material of interest and the time rate of decay of the muon polarization is monitored by detecting its emitted positron (or electron). This requires knowing the stopping and decay times with some precision. In the time-differential (TD) technique only a single muon at a time is allowed in the material so that the stopping and decay times can be uniquely associated. This requires limiting the instantaneous stopping rate to a few times 104 /s. Time resolutions of a few 100 ps are now attainable. The TD method works best with a continuous (CW) proton production beam, where the instantaneous and average muon rates are the same. In the pulsed-beam (PB) µSR technique the proton beam is delivered in relatively short pulses (of order 100 ns) between which the beam is off. This gives rise to a smearing of the time resolution (over the 100 ns), but provides a nearly background-free experiment.

The only high-intensity muon beam ever available in the US was at LAMPF, which unfortunately was sub-optimal for both the TD and the PB µSR methods. This is because of the LAMPF proton pulse structure, which consisted of a 750 µs-wide proton macro pulse delivered at 120 Hz. This structure gave rise to ~20x the instantaneous muon stopping rates of the CW cyclotrons at TRIUMF and PSI, and hence ~1/20 of the µSR data collection rates because of the necessity to limit the instantaneous muon stopping rates to less than a few times 104 /s. Thus, the nascent µSR communities from various national labs and universities who worked at LAMPF in the 1970's and 1980's largely migrated to either TRIUMF or PSI. Other potential US groups never developed at all. Note that when ISIS chose to develop a PB µSR facility in 1987 with a narrow (≅ 100 ns) proton pulse structure, the 750 µs macro pulse structure at LAMPF was again completely uncompetitive.

Brief mention of US user groups which thrived at Canadian, European and Japanese facilities. (Columbia, UC Riverside, Texas Tech, Los Alamos, Virginia Tech, ....). Fermilab facility gives us chance to get back into game. Need stats on fraction of musr at current facilities.