Shutdown Contribution of Spent Nuclear Fuel to P15A Right

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First few hours after a nuclear reactor shuts down for refueling..

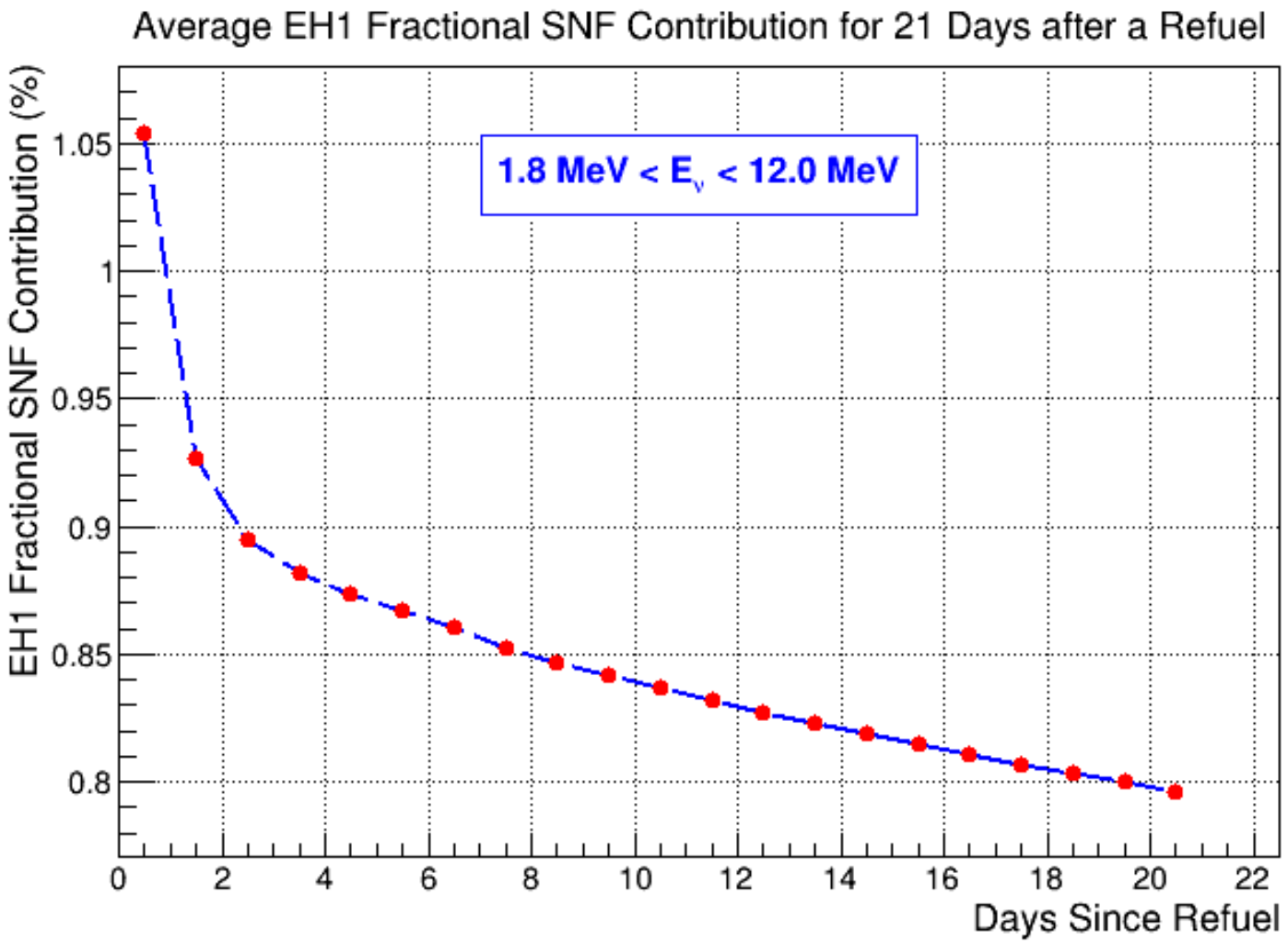
- Spent nuclear fuel (SNF) gives a significant fraction (~1%) of the signal in our detectors.
- During shutdown 1. Less reactor neutrinos and 2. More SNF
- Effect largest in EH1 since most of its signal comes from two reactors.
- Quickly decays to <1%

Question: are we sensitive enough to see this decay?

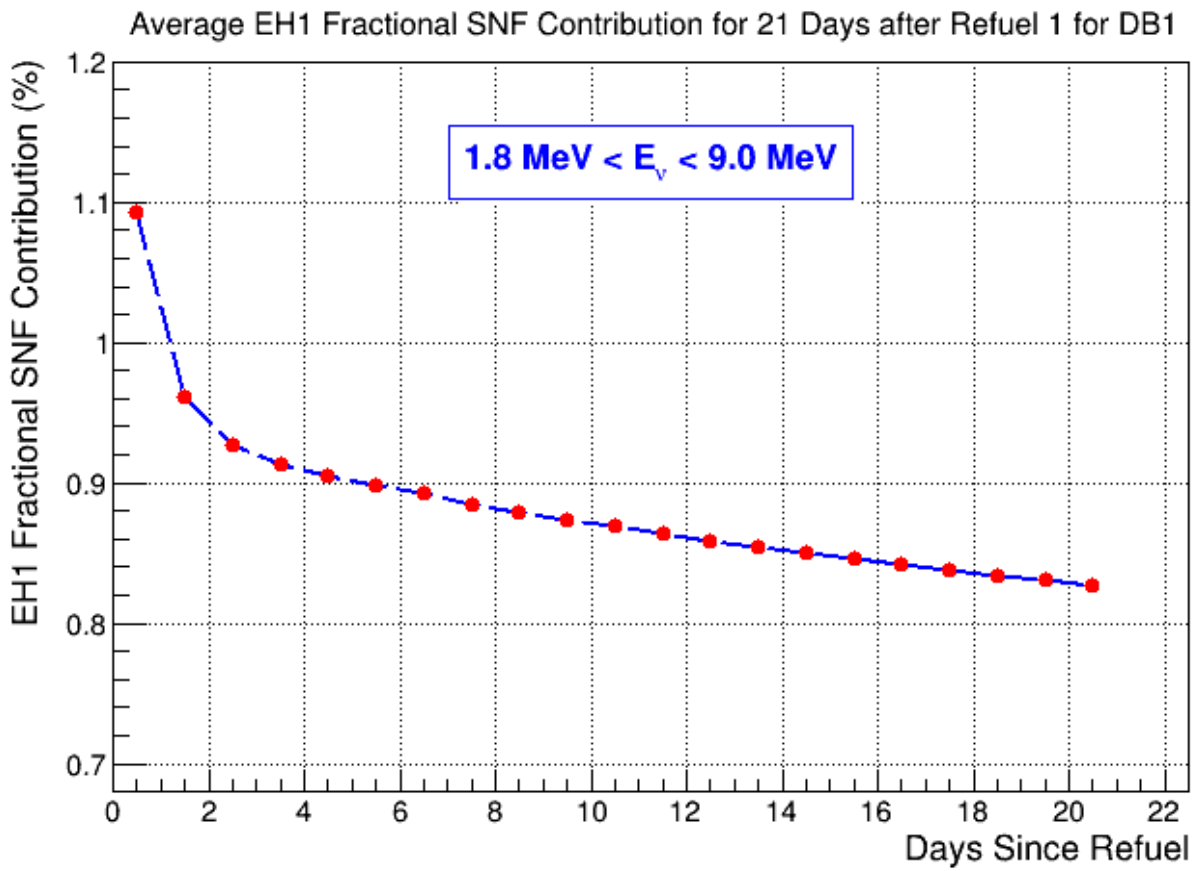
In the following slides I show SNF fraction vs day from shutdown

- SNF fraction is given as a percent of the entire IBD flux in EH1
- SNF is evaluated as a function of day from shutdown—each day is simply evaluated at its halfway (12 hour) point
- Two detectors in EH1 are averaged. EH2 detectors not included.
- Total of 5 shutdowns in P15A for two Daya Bay reactors included (3 for DB1 and 2 for DB2).

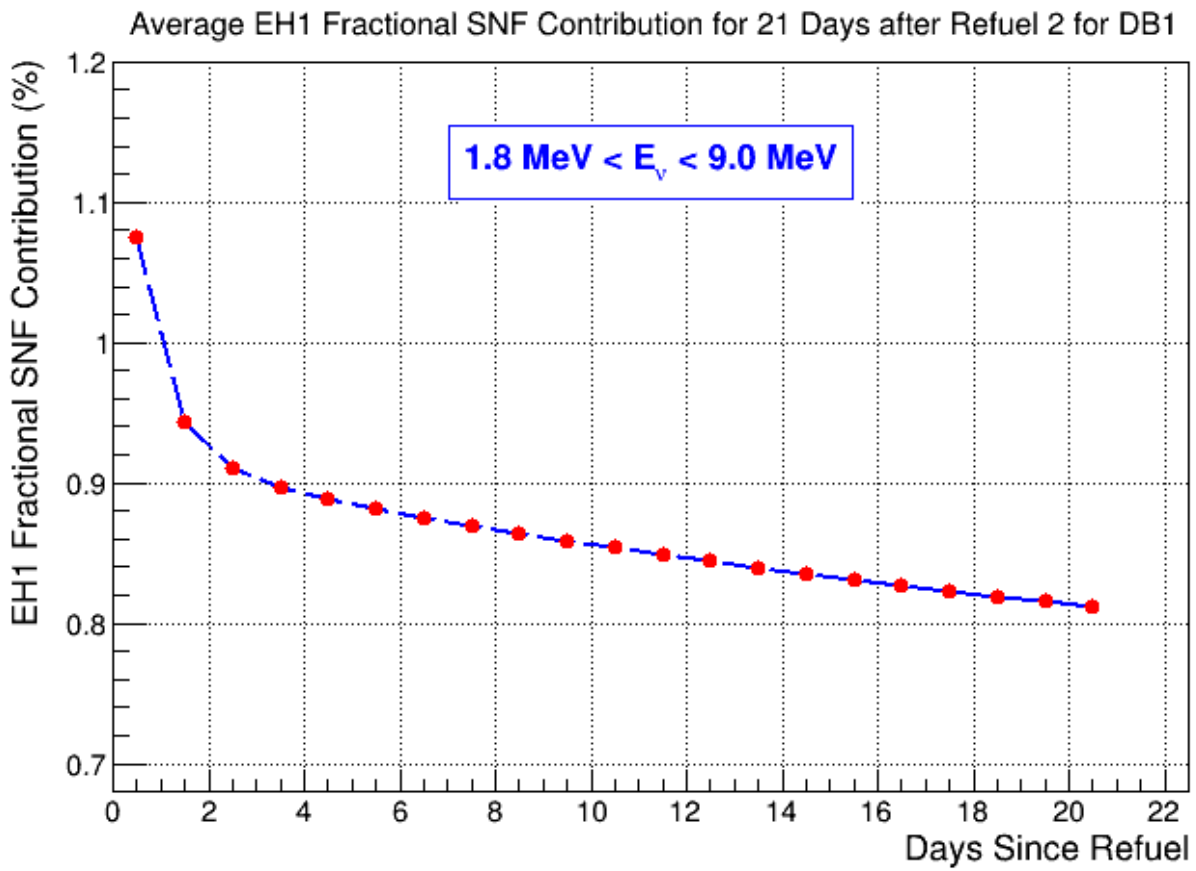
SNF averaged over 5 refuel periods in P15A



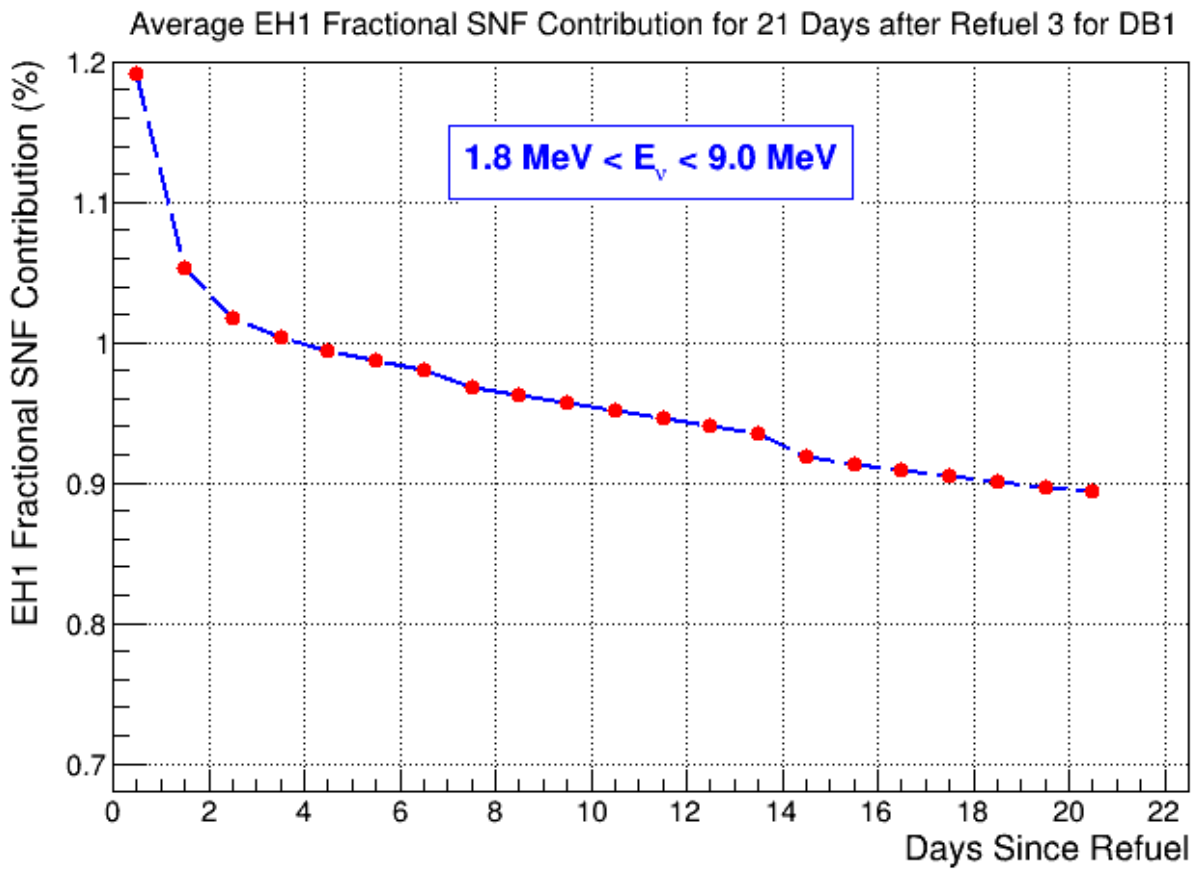
SNF vs Time for Refuel 1 DB1 Reactor



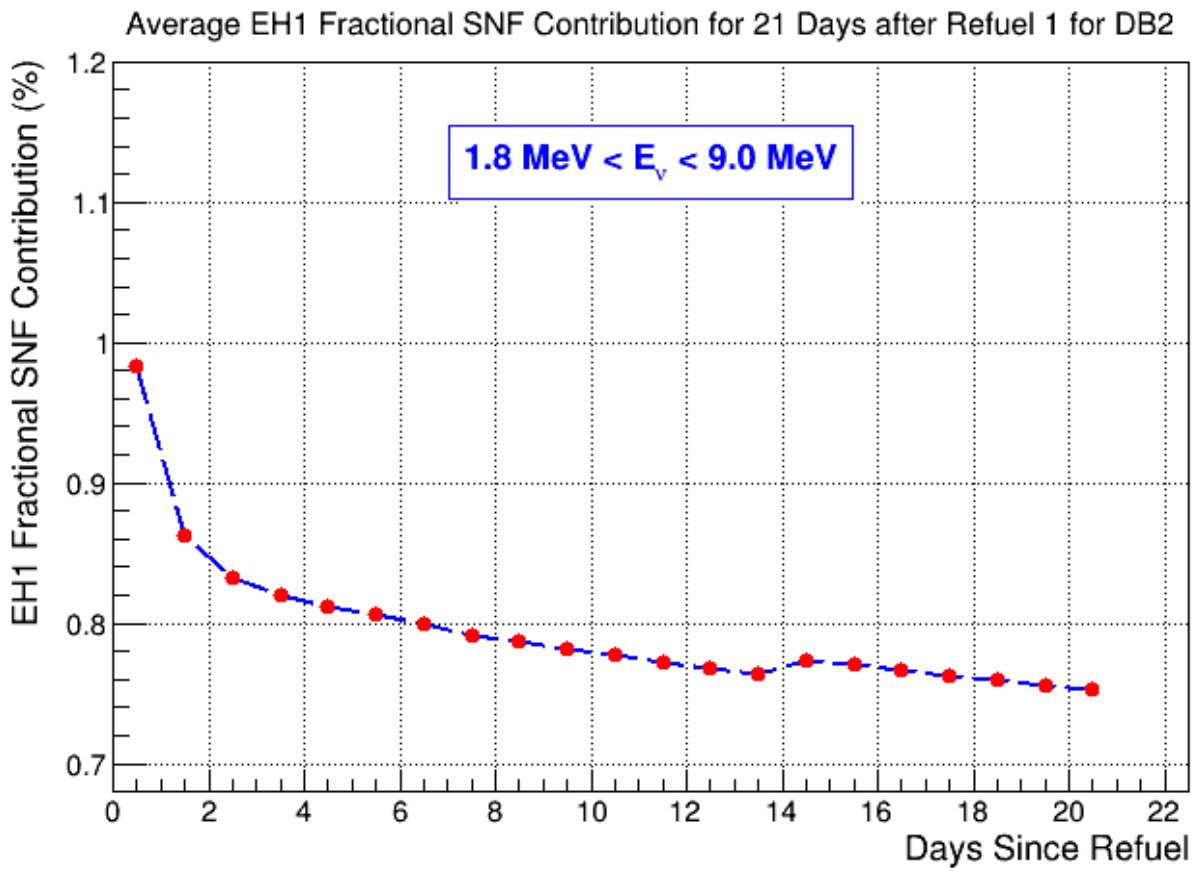
SNF vs Time for Refuel 2 DB1 Reactor



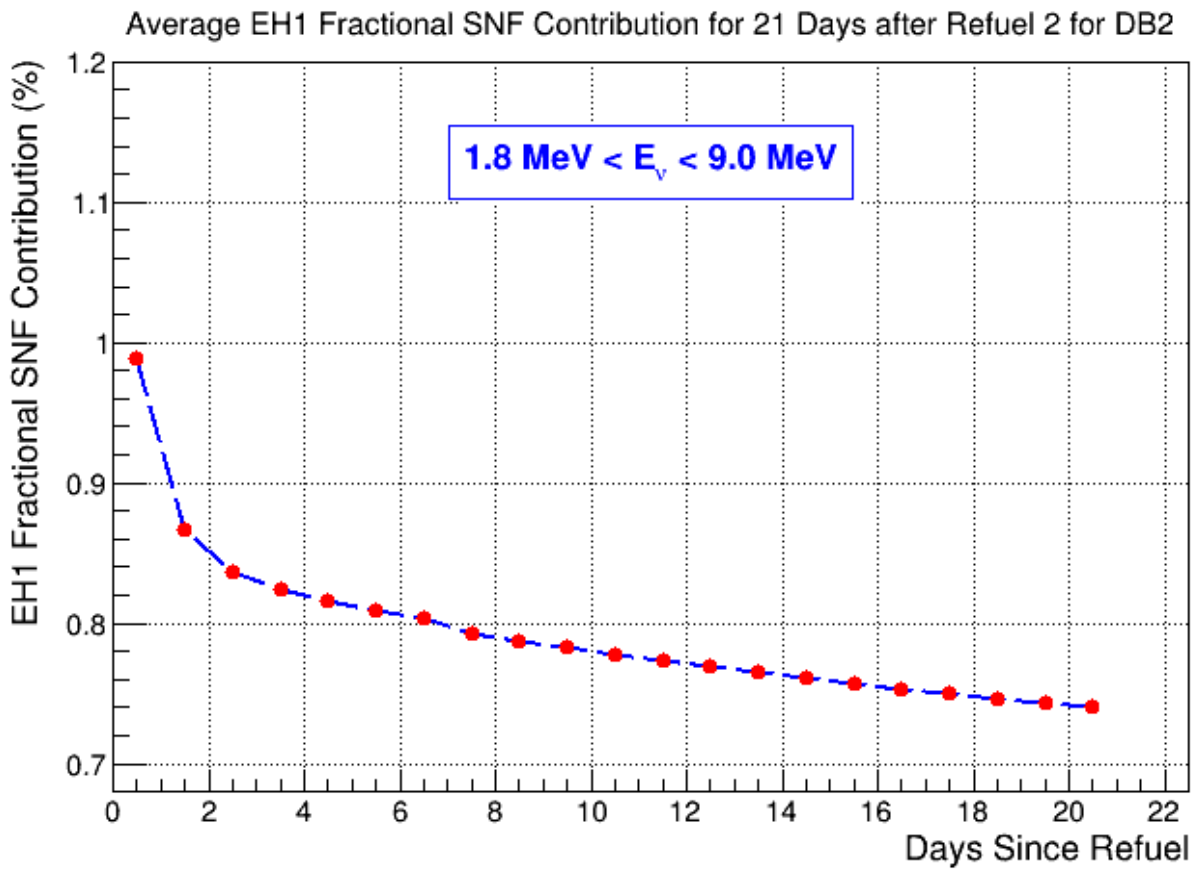
SNF vs Time for Refuel 3 DB1 Reactor



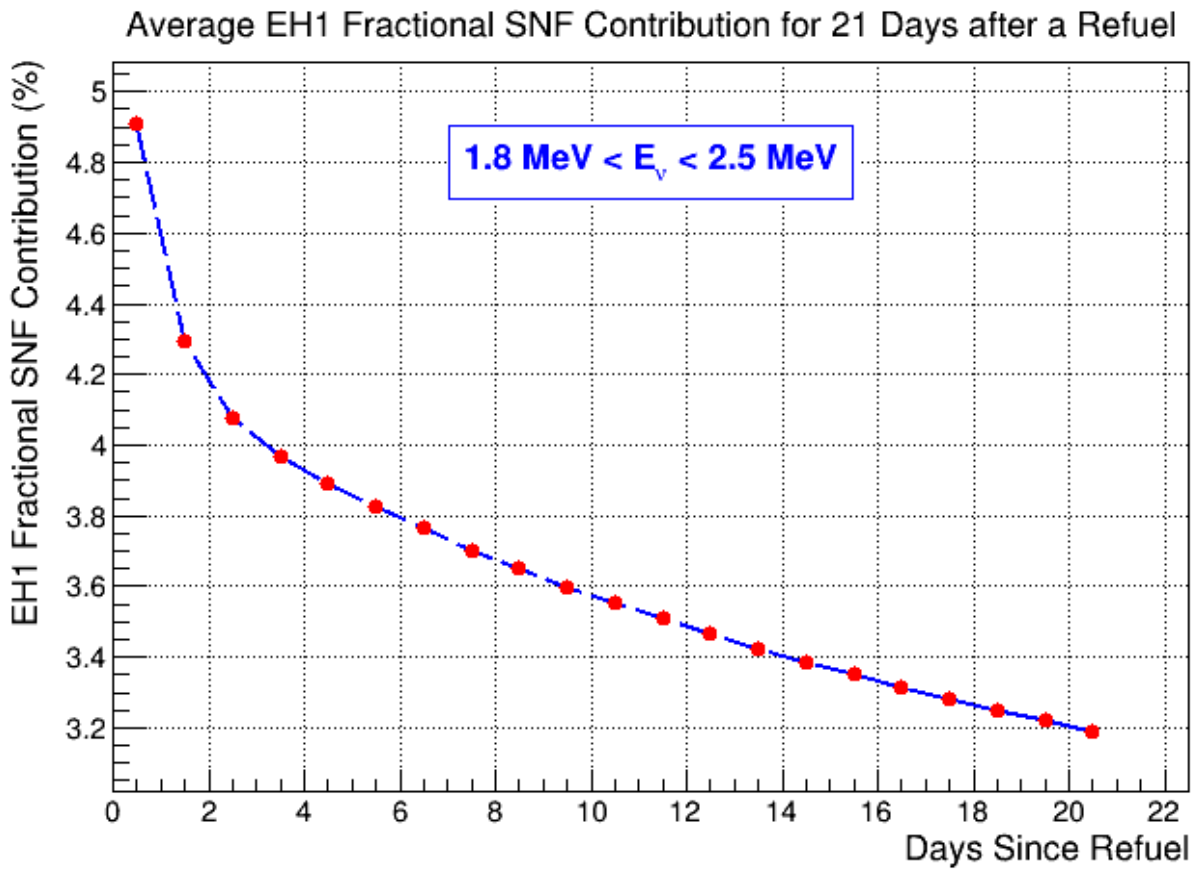
SNF vs Time for Refuel 1 DB2 Reactor



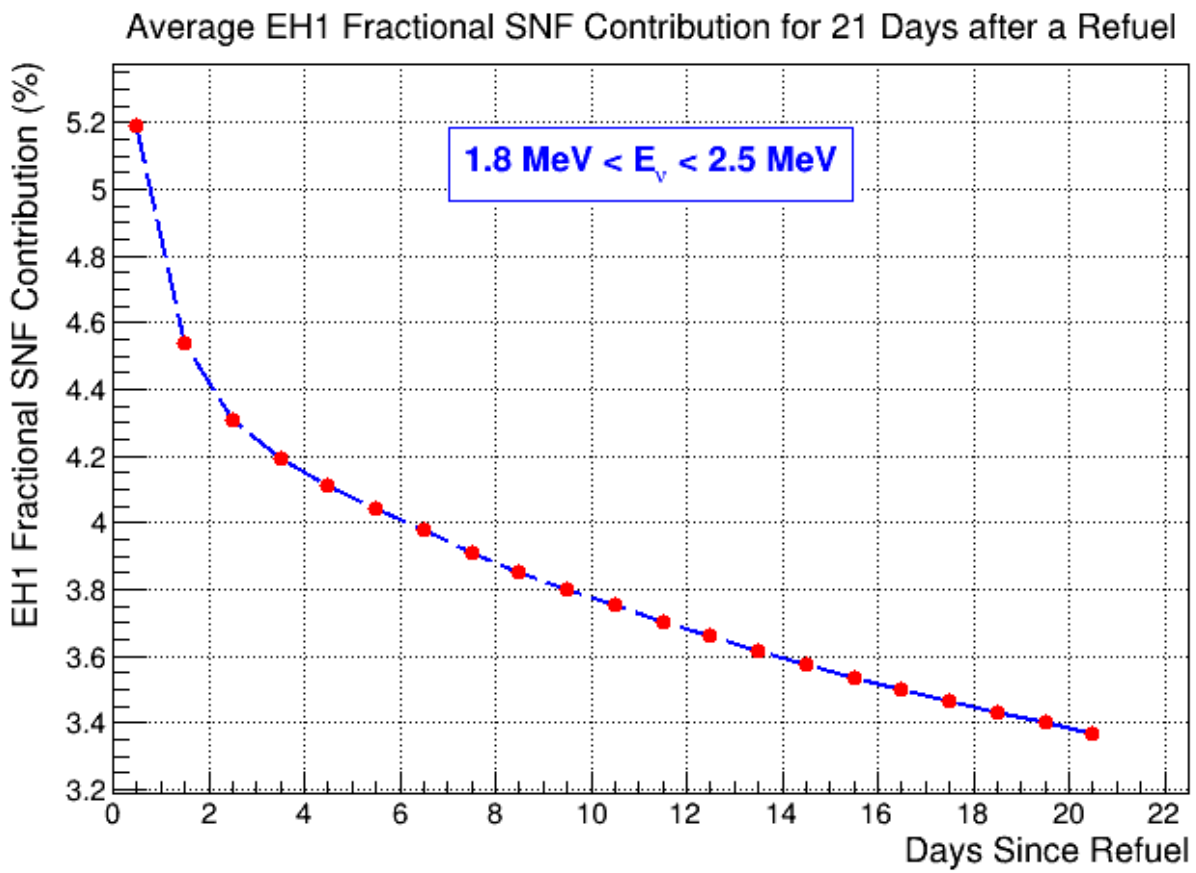
SNF vs Time for Refuel 2 DB2 Reactor



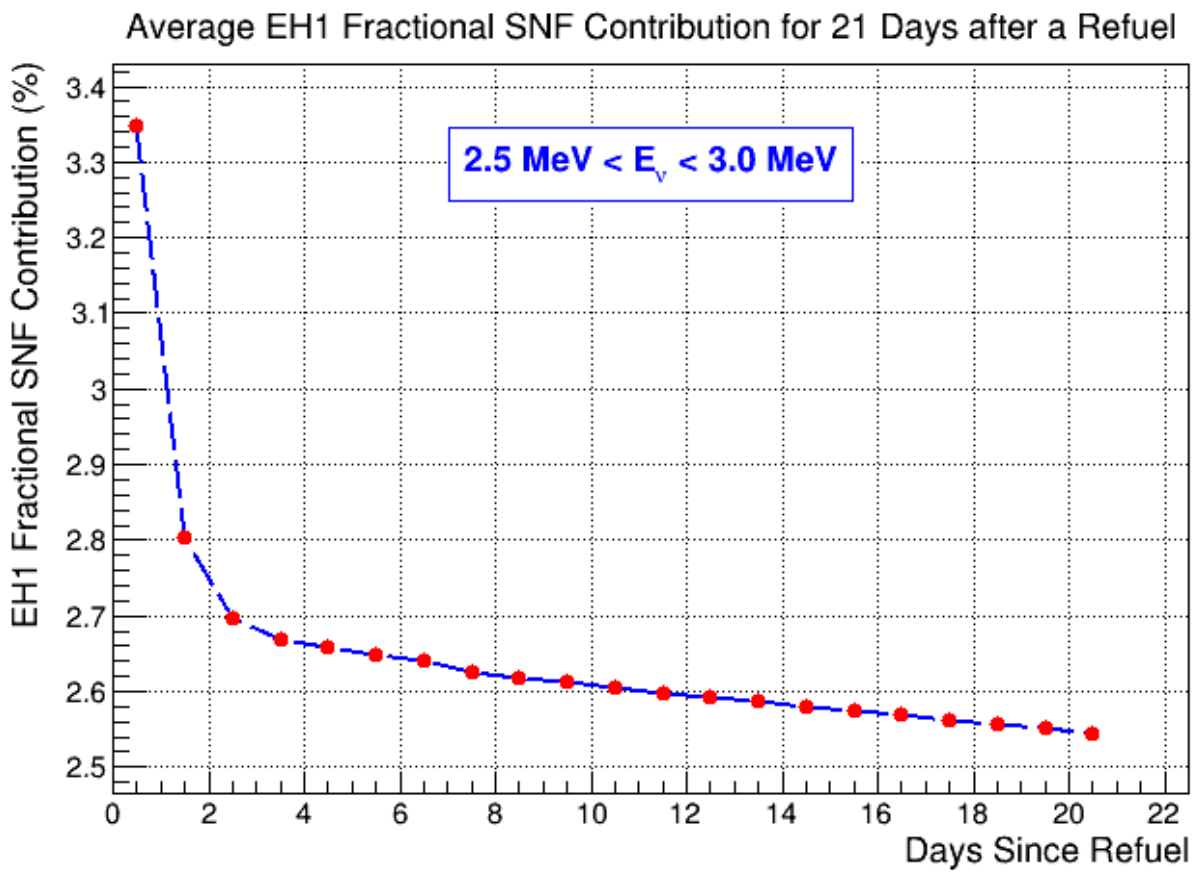
Contribution from energy bin 1.8-2.5 MeV



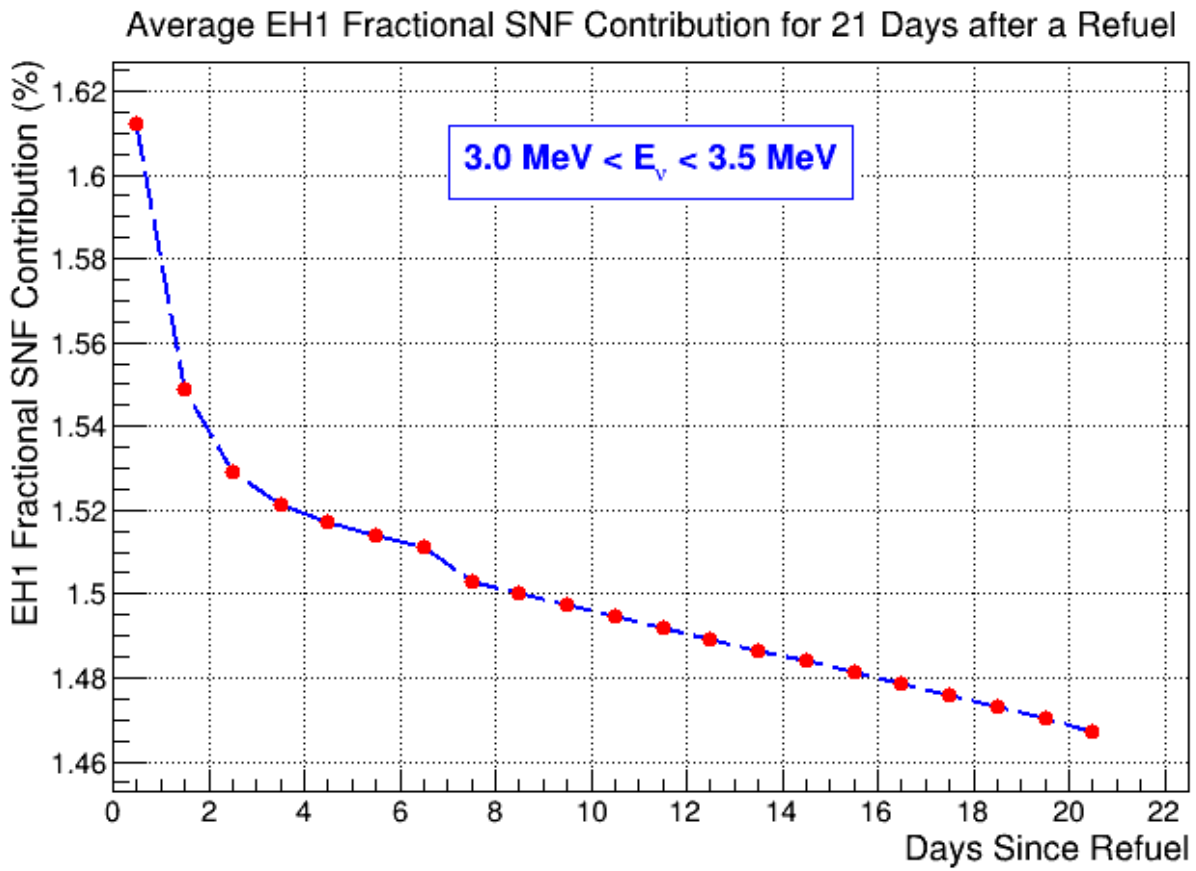
Contribution from energy bin 1.8-2.5 MeV



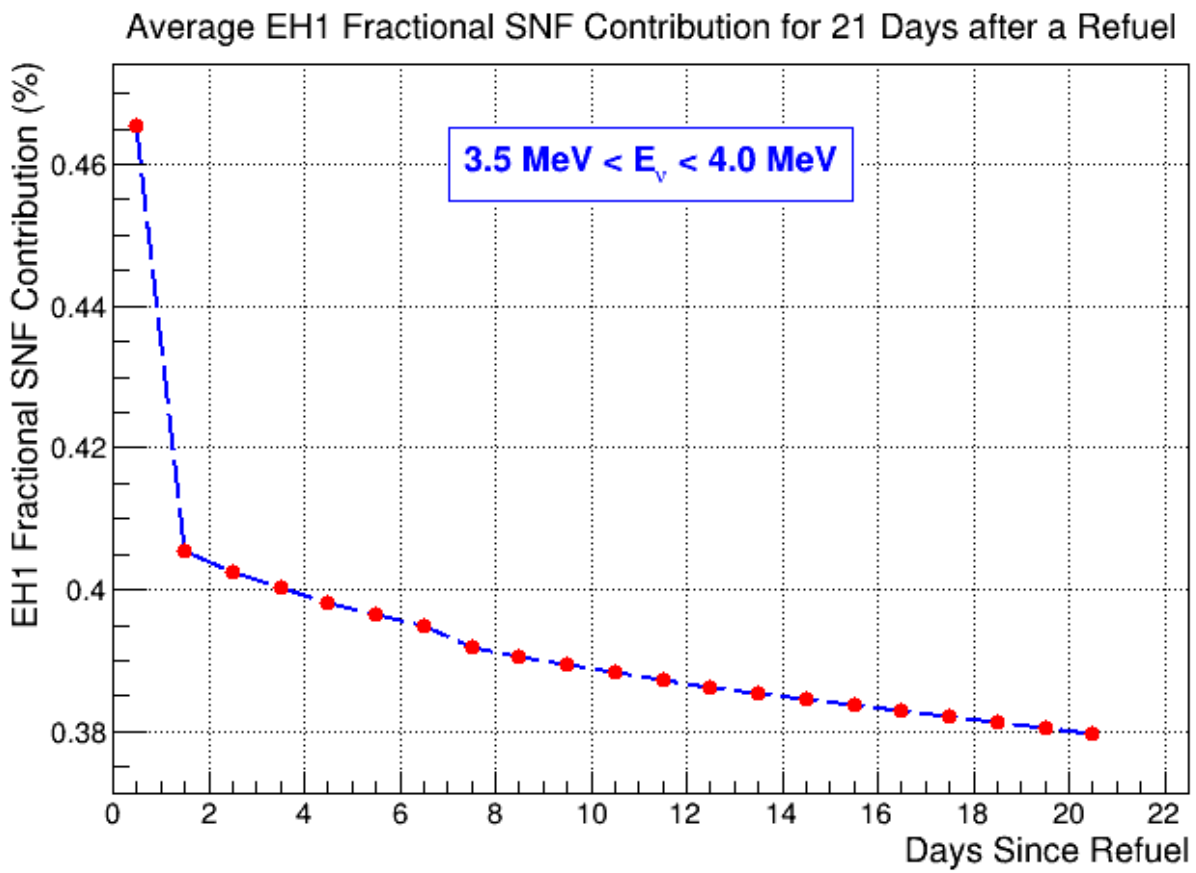
Contribution from energy bin 2.5-3.0 MeV



Contribution from energy bin 3.0-3.5 MeV



Contribution from energy bin 3.5-4.0 MeV



Conclusion

- In principle sub-percent level decay from SNF signals are present in the detectors during the first few days after reactor shutdown in EH1.
- We have a total of 5 shutdowns in P15A with an expected event rate in EH1 of ~1200 IBD's per day.
- The largest drop in SNF signal occurs during the 1st day after shutdown.
- With only 6K events expected in those 5 days immediately following a shutdown during P15A, we will not be sensitive to the <1% changes predicted to come from SNF decay.