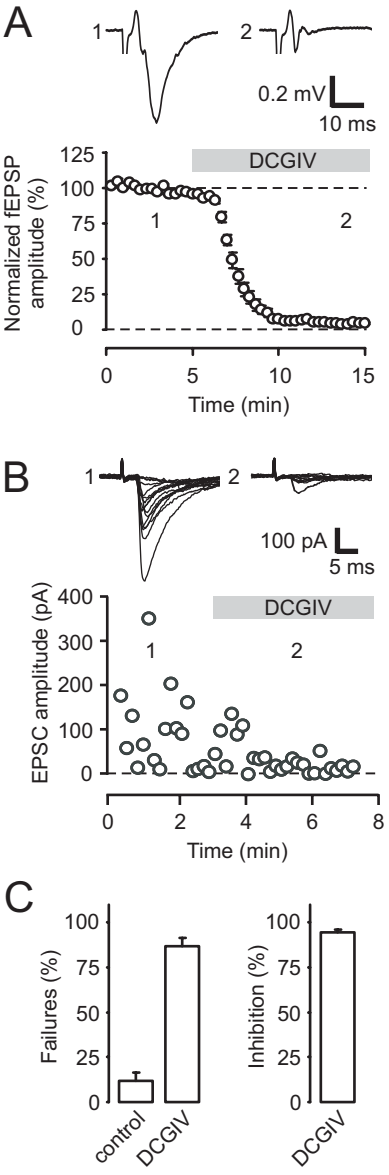
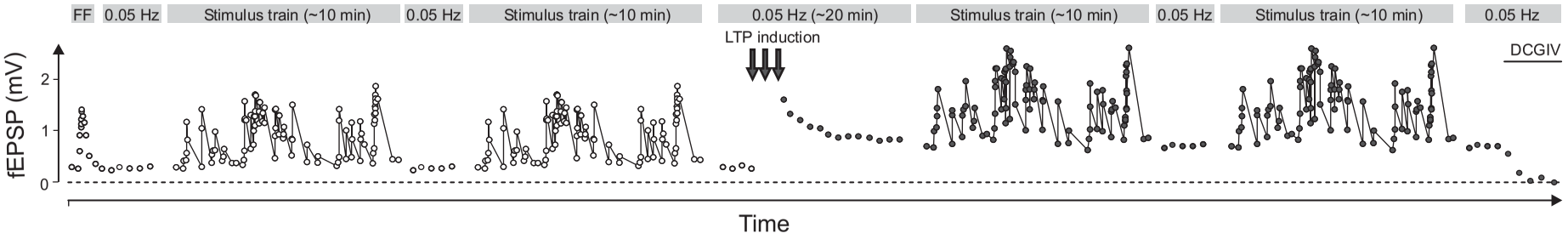
Supplemental Figure 1



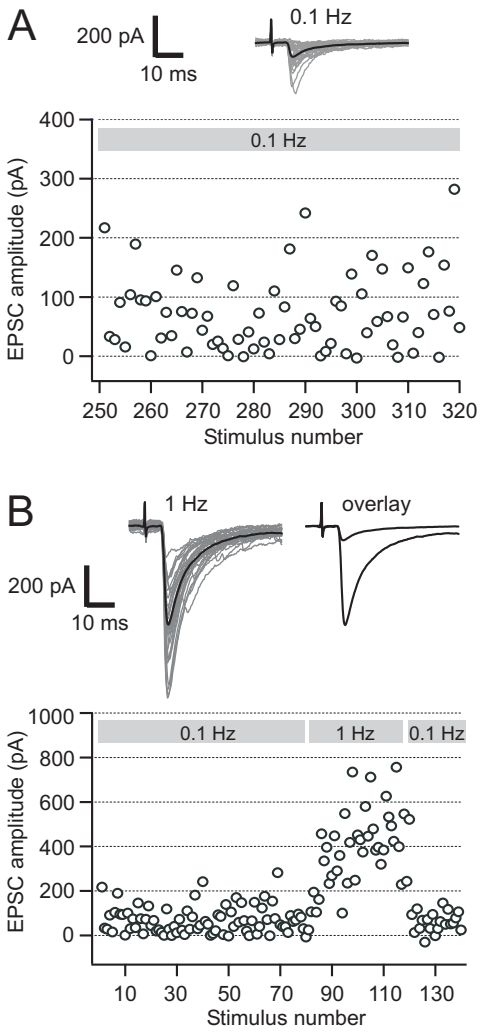
Supplemental Figure 1. *Application of the mGluR2 agonist DCGIV blocks mossy fibre synaptic responses.* (**A**) In field potential recordings, synaptic responses were completely blocked by DCGIV (0.5-1 µM) (n = 9 experiments). Upper traces show averages of 10 sweeps of a single representative experiment. (**B**) In whole-cell recordings, application of DCGIV led to the predominant occurence of failures of transmission, with only a small number of medium-sized responses left (representative experiment). Upper traces depict 15 single trial sweeps each. (**C**) In n = 5 experiments, DCGIV robustly increased the occurence of failures from 12 % to 87 % and led to a relative inhibition of synaptic response amplitudes by 94 %.

Supplemental Figure 2



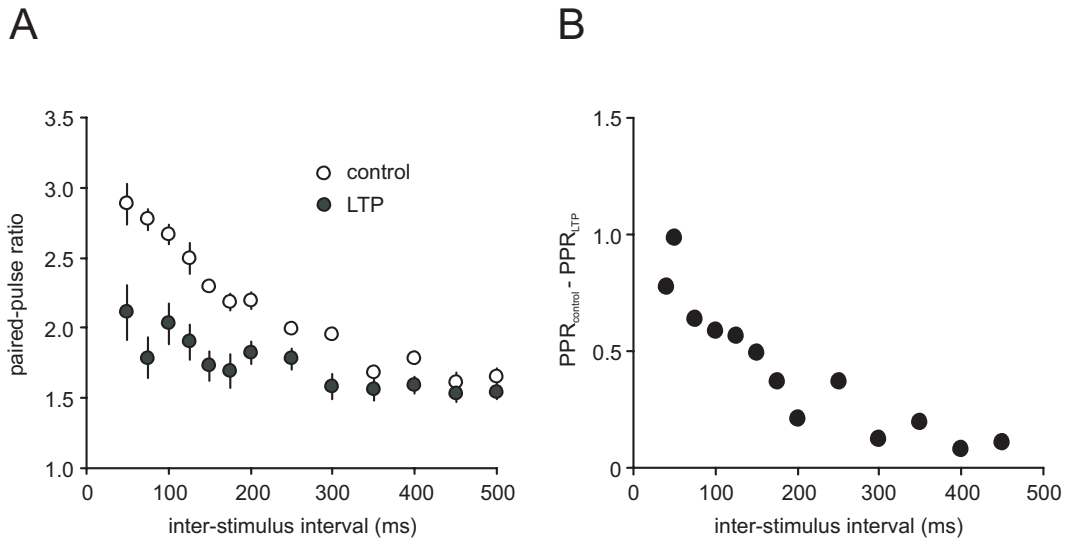
Supplemental Figure 2. *Schematic organization of experiments.* After establishing a stable mossy fibre synaptic response recording (test with frequency facilitation 'FF' in the beginning), irregular stimulus trains were applied repetitively, interrupted by constant frequency stimuli (0.05 Hz) to monitor the stability of recordings. LTP was induced by tetanic stimulation by three 125-pulse trains at 25 Hz with 30 seconds inbetween. Response amplitudes were monitored at 0.05 Hz stimulation until they were stabilized after the initial large post-tetanic potentiation. Then, irregular stimulus trains were applied again. The experiments were ended by application of the mGluR2 agonist DCGIV, which selectively blocks mossy fibre synaptic responses.

Supplemental Figure 3



Supplemental Figure 3. *Single cell mossy fibre synaptic responses are highly variable to constant stimulation.* (**A**) In an exemplary whole-cell recording, EPSC amplitudes ranged between 0 (failures of transmission) to 280 pA at a constant stimulation frequency of 0.1 Hz, with a mean response of 68 pA and a coefficient of variation (CV) of 0.89. (**B**) In the same cell, modulation of stimulation frequency to 1 Hz leads to an increase in mean amplitude to 431 pA (left upper traces) and a reduction in CV to 0.35. Upper traces in A and B show an overlay of 20 individual sweeps (gray lines) and their mean response (black line), respectively.

Supplemental Figure 4



Supplemental Figure 4. *Influence of LTP on paired-pulse facilitation*. (**A**) After the induction of LTP, the paired-pulse ratio of mossy fiber fEPSP responses is significantly reduced. This reduction is most prominent at short inter-stimulus intervals between 50 and 200 ms. Data show mean ± sem for n = 6 experiments. (**B**) The absolute difference between the paired-pulse ratios before and after LTP more clearly depicts the preferential change in the low ISI regime.