Comparison of giant radio pulses in young pulsars and millisecond pulsars

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ABSTRACT: Pulse-to-pulse intensity variations are a common property of pulsar radio emission. For some of the objects single pulses are often 10-times stronger than their average pulse. The most dramatic events are so-called giant radio pulses (GRPs). They can be 1000-times stronger than the regular single pulses from the pulsar. Giant pulses are a rare phenomenon, occuring in very few pulsars which split into two groups. The first group contains very young and energetic pulsars like the Crab pulsar, and its twin in the LMC (PSR B0540-69), while the second group is represented by old, recycled millisecond pulsars like PSR B1937+21, PSR B1821-24, PSR B1957+20, and PSR J0218+4232 - the only millisecond pulsar detected in gamma-rays. We compare the characteristics of GRP's for these two pulsar groups. In particular, we focus on the flux distributions of GRPs. Moreover, our latest findings of new features in the Crab GRPs are presented. Analysis of our Effelsberg data at 8.35 GHz shows that GRPs do occur in all phases of its ordinary radio emission, including the phases of the two high frequency components (HFCs) visible only between 5 and 9 GHz. This suggests that a similar emission mechanism may be responsible for the main pulse, the inter pulse and the HFCs. Finally, we discuss the similarities and differences between both groups of pulsars in the context of timing, spectral and polarisation properties of these pulsars. We also try to answer the question why pulsars belonging to so different classes do show the same giant radio emission phenomena.