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Development of High-Temperature Superconducting Flux Conservers for the Princeton FRC Experiment CLAYTON E. MYERS, B. BERLINGER, S.A. COHEN, Princeton Plasma Physics Laboratory — The Princeton Field-Reversed Configuration (PFRC) experiment employs an odd-parity rotating-magnetic-field (RMF) current-drive and plasma-heating system to initiate and sustain high-beta plasmas. Passive, discretized flux-conserver (FC) rings are used to apply magnetic pressure to the FRC while still allowing the RMF to penetrate to the plasma. The duration of confined high-beta plasma pulses is limited by the skin time of the FCs. Presently, the PFRC is equipped with solid copper FCs that have individual skin times of 3 ms. An upgraded PFRC facility will produce plasma pulses in excess of 10 ms, which requires FCs with skin times exceeding 100 ms. In this paper we shall review the evolution of PFRC FC arrays, culminating in new experimental studies of high-temperature (HiT) superconductor (SC) FCs. SC-FCs have been produced by embedding Hi-T SC tapes in OFHC copper FC rings. Several SC tape configurations have been studied experimentally and a wide range of extended SC-FC skin times have been produced (400 ms-12 s). Due to the high FC current required to balance the plasma pressure, critical current saturation of the SC tapes has also been closely studied.

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