**Revisions 7-27**

**Abstract**

‘… which will be necessary for some applications.’ ‘…which will be a useful post-processing step for applications that require high pulse energy, such as nonlinear spectral-broadening for $f-2f$ self-referencing, or finer spectral resolution than is natively provided by the high repetition-rate comb.’

**Microresonators**

In first paragraph: ‘Microcomb generation has been reported in a variety of platforms, including the aforementioned silica microtoroids, silica wedge \cite{Lee2012,Yi2015} and rod \cite{DelHaye2013} resonators, crystalline magnesium-fluoride \cite{Liang2011} and calcium-fluoride \cite{Savchenkov2008} whispering-gallery mode resonators, gallium-phosphide \cite{Wilson2018} and silicon \cite{Griffith2016} microresonators, and microrings made of aluminum-nitride \cite{Jung2013}, diamond \cite{Hausmann2014}, and silicon-nitride \cite{Okawachi2011,Moss2013}.’

Sec: 2.1.1: ‘As a concrete example, if $P\_{in}=10$ mW is coupled with coupling ratio $\eta=\frac{1}{2}$ into a resonator with free-spectral range of 22 GHz and linewidth of 1.5 MHz, and therefore finesse of $\mathcal{F}=14700$, the circulating power will be $\sim$ 47 W. The combination of this resonant enhancement and a small cavity mode volume enables very large circulating optical intensities in high finesse resonators (e.g. 4.7$\times$10\textsuperscript{8} W/cm\textsuperscript{2} assuming modal cross-section of 10 $\mu m^2$ in the preceding example). This makes microresonators an ideal platform for exploring nonlinear optics; continuing our concrete example, the theoretically-predicted absolute threshold power for comb generation in a silica resonator with a 1550 nm-wavelength pump laser is $P\_{in}\sim$ 0.5 mW. In practice, tens of milliwatts of optical power are used in experiments with such a resonator (see Chapter \ref{PMPumping}).’

Threshold power introduced after first mention of LLE.

**PM Pumping**

Revised eye diagram figure and corresponding caption.

Added blue text: ‘…, in this example the optical power must be increased by $\sim$15.6 dB relative to the case of phase modulation at $f\_{FSR}$.’

**Soliton Crystals**

‘We then add a second soliton $S\_+$ to the pulse train; this soliton is \textit{in phase} with the existing pulses and slightly temporally shifted from the vacancy.’

Removed ‘Also visible is suppressed comb generation where the comb-resonator detuning has been increased,’ in last paragraph of section 4.3, because actually it’s not so easy to see this in the figure.

‘When the measured experimental spectrum of a Kerr comb does not obviously correspond to a small number of solitons, then the existence of soliton crystal is indicated by simultaneous experimental measurement of: 1. A quiet repetition-rate tone when the spectrum of the photodetected power is analyzed, and 2. Single-FSR spacing in the spectrum.’

**FP-LLE**

New paragraph in introductory section: ‘In this chapter we present a theoretical investigation of the differences in the nonlinear dynamics that occur in a Kerr-nonlinear FP resonator versus a Kerr-nonlinear ring resonator. These differences arise from the modulation of the local index by both the forward- and backward-propagating field components in the cavity. This results in a contribution to the round-trip nonlinear phase shift that is proportional to the average intensity, where in contrast in the ring cavity this nonlinear phase shift depends on the instantaneous (or local) intensity alone. The effect on the system dynamics of this contribution is similar to the thermal shifts discussed in Chapter \ref{chap:microresonators}, except that this new contribution occurs on the timescale of the Kerr nonlinearity, and therefore is essentially instantaneous relative to the dynamics of comb formation. We briefly examine how this affects extended patterns, and then describe how it imparts a dispersion dependence to the boundaries of soliton existence in the $\alpha-F^2$ plane and potentially presents a new challenge to single-soliton generation that can be mitigated through the use of a pulsed pump laser.’