the record presented on Fig. 4(c1) where no difference in the level of the interleaved channels can be distinguished. After evolution in the optical magnifier (Fig. 4(c2)), differences in the level of the 10 GHz trains is readily apparent, which may facilitate further fine level adjustment.

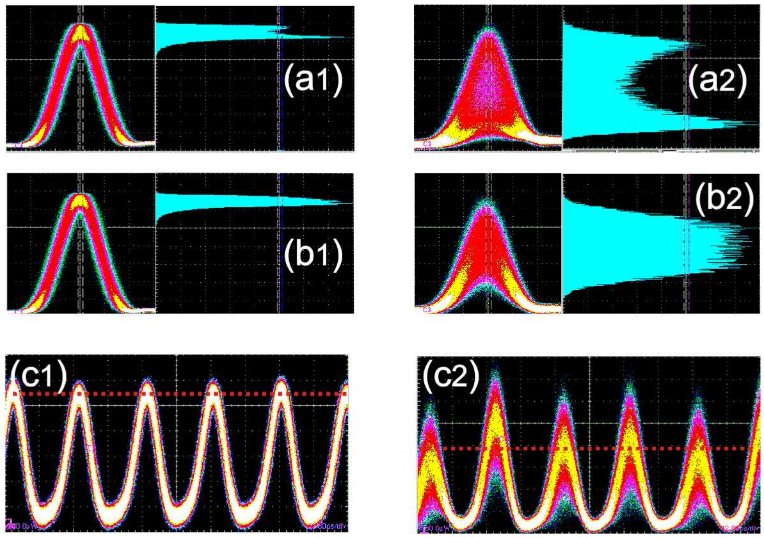

Fig. 4. Signal recorded before (subplots 1) and after (subplots 2) the optical jitter magnifier. SUT may be impaired by the electrical noise contribution of the oscilloscope (leading to a relative amplitude jitter estimated to 1%). Eye-diagrams and associated histograms of a pulse train modulated by a low frequency sinusoidal wave or by a low frequency periodic triangular wave are plotted on subplots a and subplots b, respectively. Results dealing with a 40-GHz pulse train made of four time-interleaved 10 GHz pulse trains are given on subplots (c).

5. Conclusion

To conclude, we have demonstrated a practical and flexible fiber-based device that provides an all-optical magnification of the amplitude jitter by one order of magnitude. The quasi-instantaneous nonlinear Kerr response of silica facilitates the measurement of the jitter level of stable ultrafast pulse trains and also provides an easy way to get access to the associated statistical distribution of pulse trains exhibiting low fluctuations. Potential applications are not restricted to optical telecommunications: the proposed optical amplitude jitter magnifier may become essential for the design and performance analysis of all the applications based on a highly stable pulse sources.

Our set-up relies on an anomalous highly nonlinear fiber combined with central bandpass spectral filtering. However, other fiber based schemes could also provide alternative such as normally dispersive fibers with spectral offset filtering [10,12]. Nevertheless let us point out that the involved physical process should be dependant on the peak-power of the pulse. Consequently, schemes such as nonlinear optical loop mirrors [13] where the instantaneous power is taken into account are not suitable [14]. We may also anticipate that the proposed technique will soon benefit from the recent progresses in highly nonlinear waveguides [3,15] and photonic integration that will ultimately offer compact and low cost approaches.

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